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*Proceedings of the Literary  
& Philosophical Society of Liverpool*

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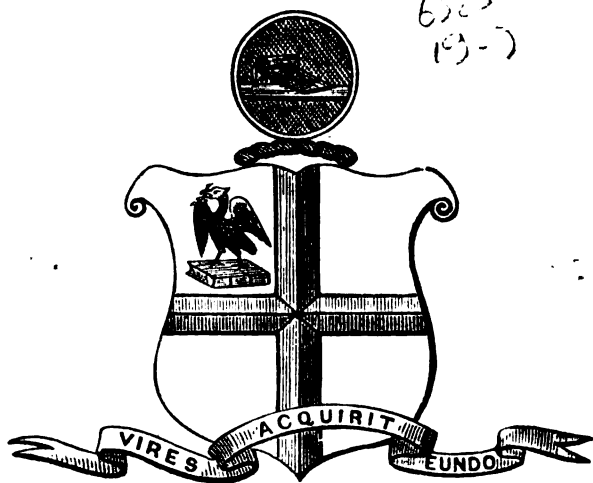








PROCEEDINGS  
OF THE  
LITERARY AND PHILOSOPHICAL SOCIETY  
OF  
LIVERPOOL,  
DURING THE  
FIFTY-SEVENTH SESSION, 1867-68.  
No. XXII.



LONDON:  
LONGMAN, GREEN, READER, & DYER.  
LIVERPOOL:  
DAVID MARPLES, LORD STREET.  
—  
1868.



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**1868.**

**This Volume has been edited by the Honorary Secretary.**

**The Authors have revised their Papers.**

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## SESSION LVII., 1867-68.

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G. H. MORTON, F.G.S., F.R.G.S.I.

ALBERT J. MOTT.

Rev. J. SEPHTON, M.A.

ED. DAVIES, F.C.S.

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## ORDINARY MEMBERS

ON THE SOCIETY'S ROLL AT THE CLOSE OF THE 57TH SESSION.

---

*Those marked † are Original Members of the Society.*

*Life Members are marked with an Asterisk.*

---

Oct. 11, 1833 Aikin, James, 2, *Drury-lane*, and 4, *Gambier-terrace*,

Nov. 4, 1867 Allen, Jno. Fenwick, *Windleshaw, St. Helens*.

Jan. 8, 1861 Anderson, David, 23, *Clifton Park, Birkenhead*.

March 7, 1864 Archer, F. jun., B.A. Trin. Coll., Cantab., 10, *Rodney-street*, and 3, *Brunswick-street*.

\*Nov. 28, 1853 Archer, T. C., F.R.S.E., F.R.S.S.A., Director of the Industrial Museum, Scotland, *Edinburgh*.

Dec. 14, 1863 Ashe, Theop. Fielding, *Atherton-street*, and 4, *Dingle-lane*.



- Feb. 22, 1855 Avison, Thomas, F.S.A., 18, *Cook-street*, and *Fulwood Park, Aigburth*.
- Dec. 10, 1860 Barr, Rev. Hermann, Ph. D., *Chatham-pl., Edge-hill*.
- Jan. 11, 1864 Bagshaw, John, 87, *Church-street*, and *Canning-terrace*, 201, *Upper Parliament-street*.
- May 1, 1854 Bahr, G. W., *Old Castle Buildings, Preeson's-row*, and 2, *South-hill Grove, Aigburth*.
- May 4, 1863 Bailey, Fras. J., M.R.C.S., 51, *Grove-street*.
- Oct. 29, 1860 Banister, Rev. W., B.A., *St. James's Mount*.
- Jan. 13, 1862 Baruchson, Arnold, *Batavia Buildings, Hackins Hey*, and *Blundell-sands, Great Crosby*.
- March 9, 1857 Bell, Christopher, *Moor-street*, and 60, *Bridge-street, Birkenhead*.
- Dec. 10, 1866 Benas, Baron Louis, Banker, 5, *South Castle-street*.
- Nov. 14, 1864 Bennett, J. M., *St. George's-place, Lime-street*, and 109, *Shaw-street*.
- Feb. 6, 1854 Bennett, William, *St. George's-place, Lime-street*, and *Lancaster*.
- Nov. 2, 1863 Billson, Alfred, 10, *Cook-street*, and 5, *Cavendish-road, Birkenhead Park*.
- Oct. 31, 1859 Birch, Jas., 13, *The Temple, Dale-street*.
- Jan. 25, 1864 Birchall, James, Governor of the *Liverpool Industrial Schools, Kirkdale*, HON. SECRETARY.
- April 15, 1861 Blake, James, 63, *Kitchen-street*, and 45, *Canning-st.*
- Mar. 9, 1866 Blood, William, *Chamber of Commerce*.
- Nov. 26, 1866 Boulton, Jos., 15, *Exchange Buildings*.
- \*Mar. 6, 1835 Boulton, Swinton, 1, *Dale-st.*, and 3, *Bedford-st. South*.
- Nov. 27, 1865 Biggs, Arthur Worthington, *Brown's Buildings*, and 76, *Upper Huskisson-street*. (I. Cook and Sons.)
- Nov. 18, 1867 Biggs, Russell H. W.; Messrs. Duncan, Squarey & Co., Solicitors, *Water-street*.
- Nov. 4, 1867 Bramwell, Ed., *Cowley Hill, St. Helens*.
- Oct. 21, 1844 Bright, Samuel, 1, *North John-street*, and *Sandheys, Mill-lane, West Derby*.
- \*Jan. 8, 1855 Brockholes, James Fitzherbert, *Puddington Old Hall, near Neston*.
- Oct. 31, 1864 Bromham, William, 57, *South John-street*, and 8, *Montpellier-terrace, Upper Parliament-street*.
- Oct. 29, 1866 Brown, Rev. H. Stowell, *Windsor-terrace*, 274, *Upper Parliament-street*.

- Dec. 2, 1861 Browne, G. Mansfield, 15, *Fenwick-street*, and 15, *South-hill-Road, Toxteth Park*.
- Nov. 12, 1866 Browne, Edgar A., 83, *Everton-road*.
- April 21, 1862 Bulley, Samuel, *Borough Buildings*, and *East Lodge, Prince's Park*.
- Feb. 4, 1867 Burden, Edward, 79, *Upper Parliament-street*.
- April 18, 1864 Burne, Joseph, *Royal Insurance Office*, 1, *North John-street*, and *Higher Tranmerr*.
- Nov. 12, 1866 Butler, Rev. G., M.A. Oxon, *The College, Liverpool*.
- \*May 1, 1848 Byerley, Isaac, F.L.S., F.R.C.S., *Victoria-road, Seacombe*, TREASURER.
- Oct. 29, 1866 Byramjee, Dadabhoy, 14, *Cook-street*.
- Feb. 28, 1863 Callon, W. J., M.D., 125, *Islington*.
- Nov. 3, 1862 Cameron, John, M.D., M.R.C.P., Physician to the Southern Hospital, and Lecturer on Medicine at the Royal Inf. Sch. of Med., 17, *Rodney-street*.
- Jan. 9, 1865 Cariss, Astrup, *Cook-street*, and 6, *Hope-place*.
- April 7, 1862 Cawkitt, James M., *Underwriters' Room, Exchange*, and 23, *Queen's-road, Everton*.
- Dec. 2, 1861 Chadburn, William, 71, *Lord-street*.
- Dec. 1, 1851 Clare, John Leigh, 11, *Exchange-buildings*, and *The Old Hall, Aigburth-road*.
- Oct. 31, 1859 Clark, Charles, 17, *North John-street*, and *Linden Cottage, Rock Ferry*.
- Jan. 26, 1857 Clay, William, 97, *Sefton-street*, and 4, *Parkhill-road*.
- Dec. 2, 1866 Clay, Rev. Walton Lowe, *Parsonage, Rainhill*.
- Jan. 26, 1863 Commins, Andrew, LL.D. Dub., *Clarendon-chambers*, 1, *South John-street*.
- Oct. 6, 1862 Crossfield, Wm., jun., 9, *Temple-ct.*, and *Alexandra-drive, Ullett-road*.
- Nov. 26, 1866 Curtis, Rev. F. H., M.A. Oxon, *The College, Shaw-st*.
- Feb. 8, 1864 Cuthbert, J. R., 40, *Chapel-street*, and 40, *Huskiisson-street*.
- Nov. 2, 1863 Dawbarn, William, *The Temple, Dale-street*, and *Mosley-hill*.
- Oct. 1, 1866 Dawson, Thomas, *Rodney-street*.
- Nov. 12, 1866 Davies, E., F.C.S., *The Laboratory, Royal Inst.*, *Colquitt-street*.
- Oct. 21, 1867 Dixon, Wm. Henry, 44, *The Albany*, and *Thornton Lodge, Hooton, Cheshire*.

- Mar. 9, 1868 Dixon, W., *North-mead, Seacombe.*
- Nov. 27, 1848 Dove, Percy Matthew, F.S.S., 1, *North John-street, and Olaughton.*
- Nov. 27, 1863 Dove, Jno. M., *Royal Insurance Office, and Olaughton.*
- Jan. 23, 1848 Drysdale, John James, M.D. Edin., M.R.C.S. Edin.,  
36, *Rodney-street.*
- Oct. 5, 1863 Drysdale, W. G., 7, *Elm-terrace, Beech-street, Fairfield,*  
and 14, *East side Queen's Dock.*
- Jan. 7, 1867 Drysdale, Donald M., 7, *Newbie-terrace.*
- Feb. 4, 1856 Duckworth, Henry, F.L.S., F.R.G.S., F.G.S., 5, *Cook-*  
*street, and 2, Gambier-terrace.*
- \*Nov. 27, 1848 Edwards, John Baker, Ph.D. Gies., F.C.S., Messrs.  
Evans, Mercer & Co., 265, *Notre Dame-st., Montreal.*
- Oct. 29, 1866 Elliot Adam, *Ashlea, Aigburth-road.*
- Feb. 24, 1868 Elliot, John, 85, *Peter's-Lane.*
- March 10, 1862 Ellison, Christopher O., *Adelphi-chambers, South John-*  
*street, and Esplanade, Waterloo.*
- April 7, 1862 English, Charles J., 26, *Chapel-st., and 26, Falkner-sq.*
- Feb. 20, 1865 English, C. R., 26, *Falkner-square.*
- Nov. 27, 1865 Estill, Fred. Chas., 1, *Liverpool and London Chambers.*
- April 30, 1860 Fabert, John Otto William, 1, *Parliament-street, and*  
3, *St. James' Mount.*
- Feb. 18, 1866 Fairclough, Rev. R. J., M.A. Cantab., 44, *Irvine-st.,*  
*Edge-hill.*
- Oct. 31, 1864 Fearenside, William, 5, *Cook-street, and Seacombe.*
- \*Dec. 13, 1852 Ferguson, William, F.L.S., F.G.S., *Oriel-chambers,*  
and 2, *St. Aidan's-terrace, Birkenhead.*
- Feb. 9, 1863 Finlay, William, Senior Mathematical Master, Middle  
School, *Liverpool College, and 49, Everton-road.*
- Oct. 1, 1866 Fletcher, Alfred, H.M. Inspector of Alkali Works for  
the Western District; *Whiston, Prescott.*
- Nov. 26, 1866 Flück, Christian, 1, *Montpellier-terrace, Upper Parlia-*  
*ment street.*
- \*Mar. 19, 1855 Foard, James Thomas, 5, *Essex-court, Temple, E.C.*
- \*Feb. 6, 1854 Gee, Robert, M.D. Heidelb., M.R.C.P., Lecturer on  
Diseases of Children, Royal Infirmary School of  
Med.; Physician, Workhouse Hospital; 5, *Aber-*  
*cromby-square.*
- March 4, 1861 Ginsburg, Rev. Christian D., LL.D. Glasg., *Brooklea,*  
*Aigburth-road, PRESIDENT.*

- Feb. 20, 1865 Gordon, Rev. A., M.A., 49, *Upper Parliament-street*.  
 Dec. 2, 1861 Graves, Samuel R., M.P., *Baltio-buildings*, and *The Grange, Wavertree*.  
 Oct. 5, 1868 Gray, Jno. M'Farlane, 47, *Canning-street, Birkenhead*.  
 Nov. 14, 1858 Greenwood, Henry, 32, *Castle-street*, and *Falkner-sq.*  
 Jan. 22, 1855 Hakes, James, M.R.C.S., Surgeon to the Northern Hospital, *Hope-street*.  
 Nov. 12, 1867 Halhead, W. B., 7, *Parkfield, Prince's Park*.  
 Feb. 23, 1863 Hall, Charlton R. 17, *Dale street*, and 111, *Shaw-street*.  
 Dec. 16, 1866 Hall, Hugh Fergie, Messrs. Charlton R. Hall & Sons, *Dale-street*.  
 Feb. 18, 1867 Hallet, ———, M.D., S. S. "City of New York." (Inman Line.)  
 \*Jan. 21, 1856 Hardman, Lawrence, 5, *India-buildings*, and *New Ferry*.  
 Feb. 9, 1863 Hart, Thos. Aubrey, M.A. Oxon, 81, *Bedford-street South*.  
 Feb. 6, 1865 Hassan, Rev. E. *Alma-terrace, Sandown-lane*.  
 Nov. 13, 1865 Hayward, John Williams, M.D., 117, *Grove-street*.  
 Feb. 6, 1865 Hebson, Douglas, 13, *Tower-chambers*, and 58, *Bedford-street South*.  
 March 6, 1865 Hey, John, M.R.C.S., 23, *Shaw-street*.  
 Dec. 28, 1846 Higgins, Rev. H. H., M.A. Cantab., F.C.P.S., *Rainhill*,  
 VICE PRESIDENT.  
 \*Oct. 31, 1836 Higginson, Alfred, M.R.C.S., Consulting Surgeon to the Southern Hospital, 44, *Upper Parliament-street*.  
 Nov. 16, 1863 Holden, Adam, 48, *Church-street*, and 6, *Carlton-terrace, Milton-road*.  
 Nov. 13, 1854 Holland, Charles, 70, *Tower-buildings South*, and *Liscard-vale, New Brighton*.  
 Mar. 9, 1868 Holme, James, Jun., 109, *Mount Pleasant*.  
 \*Dec. 14, 1862 Holt, Robert Durning, 6, *India-buildings*, and 2, *Rake-lane*.  
 March 22, 1847 Horner, Henry P., *Cook-street*, and 5, *Devonshire-road, Prince's Park*.  
 Feb. 24, 1868 Hughes, Lewis, 38, *St. Domingo Grove*.  
 \*Nov. 13, 1854 Hunter, John, Member Hist. Society, Pennsylvania, *Halifax, Nova Scotia*.  
 Jan. 13, 1862 Hutchison, Robert.

- Jan. 26, 1857 Hutton, David, 8, *St. George's-crescent*, and 61, *Canning-street*.
- \*April 29, 1850 Ihne, William, Ph. D. Bonn, *Villa Felseck, Heidelberg*.
- Feb. 23, 1857 Imlach, Henry, M.D. Edin., 1, *Abercromby-square*.
- Nov. 14, 1864 Imlach, Henry, jun., 1, *Abercromby-square*.
- \*Oct. 21, 1844 Inman, Thomas, M.D. London, M.R.C.P., Physician Royal Infirmary, 12, *Rodney-street*, and *Spital, Cheshire*.
- Nov. 28, 1864 Jeffery, F. J., *Compton House*, and *Woolton Hall, Woolton*.
- March 10, 1862 Johnson, Richard, *Queen Insurance Buildings*, and *Brookfield House, Seaforth*.
- Jan. 26, 1863 Johnson, Richard jun., *Queen Insurance-buildings*.
- \*April 4, 1852 Jones, Morris Charles, *Queen Insurance-buildings*, and 75, *Shaw-street*.
- May 5, 1851 Jones, Roger Lyon, *Liverpool and London-chambers, Exchange*, and 6, *Sunnyside, Prince's Park*.
- April 2, 1866 Jones, Rev. J. S., 3, *Clare-street*.
- Nov. 26, 1866 Jones, Edward, B.A., 1, *May-street*, Head Master of *Hibernian School*.
- Feb. 24, 1868 Jones, Chas. W., Messrs. Lamport & Holt, 21, *Water-st.*
- Oct. 2, 1865 Kendal, Robinson, 5, *Canning-street*.
- Jan. 10, 1848 Lamport, William James, 21, *Water-street*, and 5, *Yellow Noses, New Brighton*.
- \*Jan. 14, 1839 Lassell, William, F.R.S.S. L. and E., F.R.A.S., 27, *Milton-street*; 58, *Wapping*.
- April 27, 1862 Lassell, William, jun., 27, *Milton-street*, and *Tuebrook*.
- Oct. 21, 1844 Lear, John, 14, *Cook-street*, and 22, *Holland-terrace, Duke-street, Edge Hill*.
- Dec. 10, 1860 Leyland, Joseph, *Williamson-square*.
- May 4, 1863 Lister, James, *Union Bank*, 6, *Brunswick-street*, and *Greenbank*, 166, *Breckfield-road North*.
- Nov. 26, 1866 Long, Rev. R. England, 27, *Danube-st.*, *Smithdown-rd.*
- Oct. 20, 1859 M'Andrew, James Johnston, 24, *North John-street*, and *Greenfield Cottage, Bromborough*.
- \*Oct. 21, 1844 M'Andrew, Robert, F.R.S., F.L.S., *Isleworth House, Isleworth, London*.
- April 17, 1865 MacCheane, Wm., M.R.C.S., 69, *Shaw-street*.
- March 9, 1857 MacFie, Robert Andrew, 80, *Moorfields*, and *Ashfield Hall, Neston, Cheshire*.

- April 2, 1866 McMullen, James A., M.A. Dublin, *Huyton*.
- April 20, 1863 Marples, David, 50B, *Lord-street*, and 38, *Easton-grove*, *Cloughton*.
- Feb. 24, 1868 Marsh, John, *Rann Lee*, *Rainhill*.
- Jan. 21, 1839 Martin, Studley, 30, *Exchange*, and 109, *Bedford-st. S.*
- Oct. 21, 1867 Muspratt, E. K., *New Hall*, 41, *Old Hall-street*, and *Seaforth Hall*, *Seaforth*.
- Feb. 5, 1844 Mayer, Joseph, F.S.A., F.R.A.S., F.E.S., 68, *Lord-street*, and *Pennant's House*, *Lower Bebington*.
- Feb. 18, 1867 Maye, Rev. H. S., B.A., Lond., *The College*, *Liverpool*; 63, *Everton Road*.
- April 1, 1861 Melly, George, 11, *Rumford-street*, and 90, *Chatham-street*.
- Oct. 31, 1859 Moore, Thomas John, Corr. Mem. Z.S., Curator Free Public Museum, *William Brown-street*.
- Nov. 10, 1866 Moore, Rev. W. Kennedy, M.A., 67, *Grove-street*.
- Jan. 8, 1855 Morton, George Highfield, F.G.S., F.R.G.S.I., 21, *West Derby-street*, and 9, *London-road*.
- April 16, 1849 Moss, Rev. John James, B.A., *Upton*, *Cheshire*.
- Oct. 29, 1850 Mott, Albert Julius, *Church-street*, and *Sandfield*, *Waterloo*.
- April 3, 1854 Mott, Charles Grey, 27, *Argyle-street*, *Birkenhead*.
- Nov. 27, 1865 Mountfield, William, 301, *Upper Parliament-street*.
- Oct. 20, 1856 Nevins, John Birkbeck, M.D. Lond., M.R.C.S., Lect. on *Materia Medica*, Royal Infirmary School of Medicine, 25, *Oxford-street*, VICE PRESIDENT.
- April 7, 1862 Newlands, A., 5, *Brown's Buildings*, and 19, *Peel-terrace*, *Upper Canning-street*.
- Feb. 6, 1865 Newton, John, M.R.C.S., 13, *West Derby-street*.
- \*Nov. 29, 1847 Nisbet, William, L.F.P.S.G., *Church-street*, *Egremont*.
- \*Oct. 15, 1855 North, Alfred, 20, *York Crescent*, *Clifton*.
- Nov. 18, 1861 Nugent, Rev. James, *Crosby*.
- \*Dec. 10, 1866 Owen, Peter, Messrs. Farnworth & Jardine, *Liverpool* and *London Chambers*.
- Nov. 4, 1861 Philip, Thomas D., 49, *South Castle-street*, and 47, *Prospect-vale*, *Fairfield*.
- Dec. 28, 1846 Picton, James Allanson, F.S.A., Chairman of the Library and Museum Committee, 11, *Dale-street*, and *Sandy-knowe*, *Wavertree*. VICE PRESIDENT.
- April 30, 1866 Praag, Rev. James, 29, *Mount-street*.

- \*Jan. 22, 1866 Raffles, William Winter, 54, *Brown's Buildings*, and *Sunnyside, Prince's Park*.
- April 7, 1862 Rankin, Robert, Chairman of the Dock Board, 55, *South John Street*, and *Brombro' Hall, Cheshire*.
- †Mar. 13, 1812 Rathbone, William, 21, *Water-street*, and *Greenbank, Wavertree*.
- Nov. 12, 1860 Rathbone, Philip H., 4, *Water-street*, and *Greenbank cottage, Wavertree*.
- Mar. 24, 1862 Rathbone, Richard Reynolds, 11, *Rumford-street*, and *Laurel Bank, St. Michael's-road*.
- \*Jan. 7, 1856 Rawlins, Charles Edward, jun., *Unity Buildings*, 22, *Lord-st.*, and 1, *Windermere-terrace, Prince's Park*.
- \*Nov. 17, 1851 Redish, Joseph Carter.
- Dec. 10, 1866 Roberts, Rev. R. H., B.A., *Litherland-road, Bootle*.
- Feb. 4, 1867 Robinson, Jos. F., 5, *Bagot-street, Wavertree*.
- Feb. 9, 1863 Ronald, Lionel K., 19, *Dale-street*, and *Broad Green*.
- April 18, 1854 Rowe, James, 16, *South Castle-st.*, and 105, *Shaw-st.*
- Feb. 20, 1865 Samuel, Albert H., Messrs. Evans, Son, & Co., *Wood-street*, and *Canning-terrace, Upper Parliament-st.*
- April 7, 1862 Samuel, Harry S., 11, *Orange-court*, and 2, *Canning-street*.
- Nov. 18, 1864 Samuelson, Edward, 54, *Hanover-street*, and *Huyton*.
- Jan. 11, 1864 Samuelson, James, 18, *Dale-street*, and *New Brighton*.
- March 19, 1866 Sephton, Rev. John, M.A., *Liverpool Institute*.
- Nov. 16, 1863 Sheldon, E. M., M.R.C.S., 223, *Boundary-street*.
- Oct. 29, 1866 Shimmin, Hugh, 21, *Cable-street*, and *Tue-brook, West Derby*.
- Nov. 2, 1863 Skillicorn, John E., 7, *The Willows, Breck-road*.
- Nov. 7, 1864 Skinner, Thomas, M.D. Edin., 1, *St. James's Road*.
- \*April 21, 1862 Smith, James, *Barkley House, Seaforth*, and 7, *Water-street*.
- †Mar. 13, 1812 Smith, James Houlbroke, 28, *Rodney-street*, and *Greenhill, Allerton*.
- Feb. 23, 1863 Smith, J. Simm, *Royal Insurance Office, North John-street*.
- Dec. 10, 1866 Smith, Elisha, Messrs. Henry Nash & Co., 5, *India-buildings*.
- Feb. 24, 1862 Snape, Joseph, Lecturer on Dental Surgery, Royal Infirmary School of Medicine, 75, *Rodney-street*.

- Nov. 12, 1860 Spence, Charles, 4, *Oldhall-street*.
- Feb. 10, 1862 Spence, James, 5, *Fenwick-st.*, and 10, *Abercromby-sq.*
- Nov. 27, 1865 Spola, Luigi, LL.D., 1, *Lully-Street, Grove-street*.
- Jan. 22, 1866 St. Clair, Wm., 4, *Trafalgar-road, North Egremont*.
- Jan. 18, 1868 Stearn, C. H., 3, *Eldon-Terrace, Rock Ferry*.
- Dec. 14, 1857 Steele, Robert Topham, 4, *Water-street*, and *Wavertree*.
- Nov. 12, 1866 Stephenson, Rev. H. M., M.A. Cantab., *The College, Liverpool*.
- Jan. 9, 1865 Stewart, Robert E., L.D.S., R.C.S., Dental Surgeon, Southern Hospital, and Liverpool Dental Hospital, 37, *Rodney-street*.
- Oct. 18, 1858 Stuart, Richard, 10, *Exchange-street East*, and *Brooklyn Villa, Breeze-hill, Walton*.
- \*Feb. 19, 1855 Taylor, John Stopford, M.D. Aberd., F.R.G.S., 1, *Springfield, St. Anne-street*.
- Jan. 23, 1843 Taylor, Robert Hibbert, M.D. Edin., L.R.C.S. Ed., Lect. on Ophthalmic Medicine, Royal Infirmary School of Medicine, 1, *Percy-street*.
- Dec. 11, 1854 Thompson, Samuel H., *Thingwall Hall, Knotty Ash*.
- Nov. 17, 1850 Tinling, Chas., 44, *Cable-street*, and 34, *Onslow-road, Elm Park*.
- March 4, 1867 Topham, Jas. W., 156, *Chatham-street*.
- Dec. 1, 1851 Towson, John Thomas, F.R.G.S., Scientific Examiner, Sailors' Home, 47, *Upper Parliament-street*.
- Jan. 7, 1867 Trimble, Robt., *Riversdale-road, Aigburth*.
- \*Feb. 19, 1844 Turnbull, James Muter, M.D. Edin., M.R.C.P., Phys. Royal Infirmary, 86, *Rodney-street*.
- Oct. 21, 1861 Unwin, William Andrew, 11, *Rumford-place*, and *Newbie-terrace*.
- Oct. 21, 1844 Vose, James Richard White, M.D. Edin., F.R.C.P., Phys. Royal Infirmary, 5, *Gambier-terrace*.
- Mar. 18, 1861 Walker, Thomas Shadford, M.R.C.S., 30, *Rodney-street*.
- Jan. 27, 1862 Walmsley, Gilbert G., 50, *Lord-street*.
- Jan. 9, 1865 Walthew, William, *Phoenix Chambers*, and *Vine Cottage, Aughton*.
- Dec. 2, 1861 Weightman, William Henry, *Leith Offices, Moorfields*, and *Hapsford-lane, Litherland*.
- April 7, 1862 Whittle, Ewing, M.D., Lecturer on Med. Jurisprudence, Royal Inf. Sch. of Med., 65, *Catherine-street*.



- Nov. 2, 1868 Whitty, W. Alfred, "*Daily Post*" Office, and 43,  
*Shaw-street*.
- Jan. 18, 1868 Whitworth, Rev. W. A., B.A., 16, *Percy-street*, and  
*Queen's College, Liverpool*.
- Dec. 16, 1867 Wilson, Rev. Andrew, B. A., Cantab., 14, *Queen-street*,  
*Edge Hill*.
- Mar. 18, 1861 Wood, Geo. S., 20, *Lord-street*, and *Bellevue-road*,  
*Wavertree*.
- Dec. 14, 1868 Zwilchenbart, Rodolph, jun., *Queen Insurance Buildings*,  
and 26, *Bedford-street South*.

## HONORARY MEMBERS,

LIMITED TO FIFTY.

- 1.—1812 Peter Mark Roget, M.D. Edin., F.R.C.P., F.R.S., F.G.S., F.R.A.S., F.R.G.S., &c., 18, *Upper Bedford-place, London.*
- 2.—1819 John Stanley, M.D. Edin., *Whitehaven.*
- 3.—1827 Rev. William Hincks, F.R.S.E., F.L.S., Professor of Natural History in University College, *Toronto, C.W.*
- 4.—1828 Rev. Brook Aspland, *Dukinfield, Cheshire.*
- 5.—1833 The Right Hon. Dudley Ryder, Earl of Harrowby, K.G., D.C.L., F.R.S., *Sandon-hall, Staffordshire*, and 39, *Grosvenor-square, London, W.*
- 6.—1833 James Yates, M.A., F.R.S., F.L.S., F.G.S., &c., *Lauderdale House, Highgate, London.*
- 7.—1835 George Patten, A.R.A., 21, *Queen's-road West, Regent's Park, London.*
- 8.—1835 William Ewart, M.P., *Cambridge-square, Hyde-park, London.*
- 9.—1836 The Most Noble William, Duke of Devonshire, K.G., M.A., F.R.S., F.G.S., &c., Chancellor of the University of Cambridge, *Devonshire House, London, W., and Chatsworth, Derbyshire.*
- 10.—1838 George Biddell Airy, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon. M.R.I.A., V.P.R.A.S., F.C.P.S., &c., Astronomer Royal, *Royal Observatory, Greenwich.*
- 11.—1840 James Nasmyth, F.R.A.S., *Penshurst, Kent.*
- 12.—1840 Richard Duncan Mackintosh, L.R.C.P., *Exeter.*
- 13.—1841 Charles Bryce, M.D. Glasg., Fell.F.P.S.G., *Brighton.*
- 14.—1844 J. Beete Jukes, M.A., F.R.S., M.R.I.A., F.G.S. Local Director of the Geological Survey of Ireland, 51, *Stephen's-Green, Dublin.*
- 15.—1844 T. P. Hall, *Coggeshall, Essex.*
- 16.—1844 Peter Rylands, *Warrington.*
- 17.—1844 John Scouler, M.D., LL.D., F.L.S., *Glasgow.*
- 18.—1844 Thomas Rymer Jones, F.R.S., F.Z.S., F.L.S., Professor of Comparative Anatomy, *King's College, London.*

- 19.—1844 Robert Patterson, F.R.S., M.R.I.A., *Belfast*.
- 20.—1854 Sir Charles Lemon, Bart. M.A. Cantab., F.R.S., F.G.S.,  
*Penrhyn, Cornwall*.
- 21.—1844 William Carpenter, M.D. Edin., F.R.S., F.L.S., F.G.S.,  
Registrar *London University*.
- 22.—1848 Rev. Thomas Corser, M.A., *Strand, Bury*.
- 23.—1850 Rev. St. Vincent Beechy, M.A. Cantab., *Worsley, near Eccles*.
- 24.—1851 James Smith, F.R.S.S.L. and E., F.G.S., F.R.G.S., *Jordan-*  
*hill, Glasgow*.
- 25.—1851 Henry Clarke Pidgeon, *London*.
- 26.—1851 Rev. Robert Bickersteth Mayor, M.A., Fell. St. John's  
College, Cantab., F.C.P.S., *Rugby*.
- 27.—1852 William Reynolds, M.D., *The Cloisters, St. Michael's*  
*Hamlet, Aigburth Road*.
- 28.—1853 Rev. James Booth, LL.D., F.R.S., &c., *Stone, near Aylesbury*.
- 29.—1857 Thomas Jos. Hutchison, F.R.G.S., F.R.S.L., F.E.S.,  
H.B.M. Consul, *Rosario*.
- 30.—1861 Louis Agassiz, Professor of Natural History in Harvard  
University, *Cambridge, Massachusetts*.
- 31.—1861 William Fairbairn, LL.D., C.E., F.R.S., *Polygon, near*  
*Manchester*.
- 32.—1861 Rev. Thomas P. Kirkman, M.A., F.R.S., *Croft Rectory,*  
*Warrington*.
- 33.—1862 The Right Rev. H. N. Staley, D.D., Bishop of Honolulu,  
*Sandwich Islands*.
- 34.—1863 Edward J. Reed, Chief Constructor of H. M. Navy,  
*Admiralty, and Hyde Vale, 3, Greenwich, S.E.*
- 35.—1865 John Edward Gray, Ph. D., F.R.S., &c., *British Museum*.
- 36.—1865 George Rolleston, M.D., F.R.S., Linacre Professor of  
Physiology in the University of Oxford, *Oxford*.
- 37.—1866 Cuthbert Collingwood, M.A. and M.B. Oxon, F.L.S.
- 38.—1867 J. W. Dawson, LL.D., F.R.S., F.G.S. &c., Principal and  
Vice-Chancellor of McGill University, *Montreal*.
- 39.—1868 Captain Sir James Anderson, *Atlantic Telegraph Company,*  
*London*.

## CORRESPONDING MEMBERS.

## LIMITED TO THIRTY-FIVE.

- 1.—1867 Albert C. L. G. Günther, M.A., M.D., Ph.D., British Museum,  
Editor of the "Zoological Record."
- 2.—1867 J. Yate Johnson, *London*.
- 3.—1867 R. B. N. Walker, *Gaboon, West Africa*.
- 4.—1868 Rev. J. Holding, M.A., F.R.G.S., *London*.

## ASSOCIATES.

## LIMITED TO TWENTY-FIVE.

- 1.—Jan. 27, 1862 Captain John H. Mortimer, "America," (Atlantic.)
- 2.—March 24, 1862 Captain P. C. Petrie, "City of London," Commo-  
dore of the Inman Line of American Steam  
Packets. (Atlantic.)
- 3.—Feb. 9, 1863 Captain James P. Anderson, R.M.S.S. "Africa,"  
Cunard Service. (Atlantic.)
- 4.—Feb. 9, 1863 Captain John Carr, (Bushby and Edwards,) ship  
"Scindia." (Calcutta.)
- 5.—Feb. 9, 1863 Captain Charles E. Price, R.N.R., (L. Young  
and Co.) ship "Cornwallis." (Calcutta and  
Sydney.)
- 6.—April 20, 1863 Captain Fred. E. Baker, ship "Nippon."  
(Chinese Seas.)
- 7.—Oct. 31, 1864 Captain Thompson, ship "Admiral Lyons."  
(Bombay.)
- 8.—Oct. 31, 1863 Captain Edward Berry, ship "Richard Cobden."  
(Chili.)
- 9.—Oct. 31, 1864 Captain Alexander Browne, (Papayanni,) S. S.  
"Agia Sofia." (Mediterranean.)

- 10.—Oct. 31, 1864 Captain Whiteway, ship "Annie Cheshyre."  
(Pacific.)
- 11.—April 13, 1865 Captain Alexander Cameron, (Boult, English,  
and Brandon,) ship "Staffordshire." (Shanghai.)
- 12.—Dec. 11, 1865 Captain Walker, ship "Trenton."
- 13.—Mar. 23, 1868 Captain David Scott.

**TREASURER'S ACCOUNT, 1866-67.**

**Dr.**

*The Literary and Philosophical Society in Account with ISAAC BYERLEY, Treasurer, to October, 1867.*

**Q1.**

<b>To paid Mr. Marples, for Printing</b> .....	£	s.	d.
" Mr. Tindal, for Printing and Stationery .....	50	0	0
" Secretary's Expenses of Management, viz., Postages, Messengers, and Small Items .....	15	16	0
Messrs. Townshend & Son's Account .....	£3	2	10
Delivery of Circulars and Notices ....	1	8	0
Editorial fee .....	6	18	8
.....	10	10	0
" Mrs. Johnson's Account for Tea, Coffee, &c. ....	21	14	1
" Collector's Commission .....	20	2	0
" Waiters' Attendance .....	7	14	0
" Phipps and Fenton, Lithographing Dr. Edwards' Address .....	2	2	6
.....	2	10	0
.....	119	18	7
<b>Balance carried down</b> .....	825	14	8
.....	£445	12	10

*Errors excepted.*

<b>By Balance from last Account—</b>	£	s.	d.
Dock Bonds.....	£250	0	0
In Treasurer's hands .....	2	10	4
.....	252	10	4
Annual Subscriptions.....	164	17	0
Arrears .....	2	2	0
Entrance fees .....	14	8	6
Interest upon Dock Bonds.....	12	0	0
<hr/>			
Dock Bonds.....	£250	0	0
In Treasurer's hands.....	75	14	8
.....	£325	14	8

**Audited and found correct, { J. A. PICTON.  
WM. UNWIN.**

**Errors excepted.**

**Audited and found correct, { J. A. PICTON.  
WM. UNWIN.**



PROCEEDINGS  
OF THE  
LIVERPOOL  
LITERARY AND PHILOSOPHICAL SOCIETY.

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ANNUAL MEETING—FIFTY-SEVENTH SESSION.

ROYAL INSTITUTION, OCTOBER 7th, 1867.

The REV. C. D. GINSBURG, LL.D., PRESIDENT,  
in the Chair.

The minutes of the last meeting of the fifty-sixth session were read and signed, after which the HONORARY SECRETARY read the following

REPORT.

The Council of the Literary and Philosophical Society, in presenting their report for the fifty-sixth session, find themselves again in the pleasant position of being able to congratulate the members upon the success which continues to attend the proceedings of their Society. Every meeting of the last session was well attended, and the papers which



were presented called forth discussions which in one instance had to be adjourned to a subsequent meeting.

The Council feel that it is a subject of much regret that the Volumes containing the most important of these communications, extending over the last two sessions, are not yet in the hands of the members. Their publication has been delayed by circumstances entirely beyond the control of the council, but arrangements have now been made by which both volumes will be issued forthwith.

At the same time the Council are of opinion that the prompt publication of the Society's Transactions depends in a great measure upon those members who favour the Society with communications having their papers ready for the press immediately after they are read; they therefore regard the suggestion which was communicated to the Society during the last session, that the papers should be published periodically during the session in which they are presented, as of considerable importance, and one which, if it can be realised, will prevent the Society from falling in future into such arrears.

The Society has during the session received an addition of thirty-five new members, whilst it has lost by removals from the town, or other circumstances, only ten, leaving the number of the ordinary members two hundred and twenty-four.

The more important objects of the Society, in the promotion of literature and science, have received an additional stimulus in the creation of the new class of Corresponding Members, which is to consist only of those who, being actively engaged in literary or scientific pursuits, or in geographical exploration, will be likely to contribute valuable communications to the Society's Proceedings, or adopt its Volume of Transactions as a vehicle for imparting the results of their researches. Three gentlemen, who had already favoured the Society in this respect, have been admitted to this new class;

one Honorary Member has been added to the thirty-eight previously on the roll, and the number of Associates remains as before, namely thirteen. The grand total of the Society's Members thus amounts to two hundred and seventy-nine.

At the suggestion of your Council an application has been made to the British Association, on behalf of all the local societies, together with the Mayor and Corporation, requesting that body to hold its Annual Meeting for 1869 in Liverpool. The answer to this application cannot be definitively given before the next Annual Meeting of the Association, which will take place in Norwich; but there is every reason for believing that the application will be successful.

With one exception, already mentioned, no important change has taken place in the constitution of the Society, as the slight alteration in the hour of commencing the business of each meeting, though affording greater convenience to the members, does not demand more than a passing mention in this report.

The "receptions" continue to maintain their popularity, and have infused much cordiality and vigour among the members.

Your Council have now to conclude their Report with the recommendation of the following five Gentlemen for election on the new Council, in conformity with the 36th law:—The Rev. John Sephton, M.A.; and Messrs. John M'Farlane Gray, Morris C. Jones, G. H. Morton, F.G.S., and Albert J. Mott.

It was then moved by Mr. A. J. Mott, seconded by Mr. Robinson, and resolved, "That the Report now read be received and adopted."

The Treasurer then submitted the Annual Statement of Accounts, which was unanimously passed, on the motion of Mr. Higginson, seconded by Mr. Marples.

The Society next proceeded to elect the officers for the year and the following gentlemen were appointed :—

*Vice-Presidents :*

Mr. J. A. PICTON,  
Dr. NEVINS,  
Rev. H. H. HIGGINS.

*Treasurer :*

Mr. I. BYERLEY.

*Hon. Secretary :*

Mr. JAMES BIRCHALL.

*Members of Council :*

Mr. HIGGINSON,  
Rev. W. B. BANISTER,  
Mr. ARCHER,  
Mr. MOORE,  
Mr. M'FARLANE GRAY,  
Mr. M. C. JONES,  
Mr. G. H. MORTON,  
Mr. A. J. MOTT,  
Rev. J. SEPHTON.

The Associates were then re-elected, on the recommendation of the Council.

# FIRST ORDINARY MEETING.

ROYAL INSTITUTION, 21st October, 1867.

DR. NEVINS, VICE-PRESIDENT, in the Chair.

The Minutes of the last Meeting were read and signed.

Messrs. E. K. Muspratt and William Henry Dixon were unanimously elected ordinary members.

Mr. Christian Flück exhibited a flint saw, a knife made of bone, bone pins, piece of roebuck horn, and other implements, recently found in a Lacustrine dwelling in the lake of Morat, in Switzerland.

Mr. T. J. Moore exhibited some bones of the Dodo, lately presented to the Free Public Museum, by Mr. Walmsley Stanley, per Mr. R. C. Doyle and Mr. J. T. Towson; also the cast of the under jaw of a Mastodon, the original of which, with the greater part of the skeleton, was lately discovered near Albany, New York. The cast was presented to the Museum by Professor Hall, state geologist at Albany, and was brought to Liverpool by his son, Mr. C. E. Hall, who was present at the meeting. Mr. Moore read the following extract from a letter from Mr. R. B. N. Walker, Corresponding Member of the Society:—

“ R. Fernan Vas, Camma, July 13, 1867

\* \* \* “ On the 26th ult., a few days after my arrival here, one of the men who had accompanied me into the interior came to see me, and asked for powder and ball to enable him to fulfil his promise of shooting a gorilla for me.

He being a professed gorilla hunter, and having once killed no less than four of those apes in one day, I immediately gave him what he required. He went out the next day, but was unable to meet with the object of his search, and for various reasons was prevented trying again until the 6th instant, when, on rising early in the morning, he heard the cry of a gorilla in the bush close to his village, and immediately started, accompanied by another lad, who was unarmed, with the exception of a hatchet to clear a passage through the dense bush. Guided by the noise made by the animal, the hunter soon obtained a view of him, and fired, wounding him severely in the right shoulder, and breaking one of his huge canine teeth. Reloading he fired again, striking him on the back, and breaking one or two of his ribs. The animal was unusually tenacious of life, and my man, having become separated from his companion, who carried part of the ammunition, had to go in search of him to procure some powder; when he returned, and at the sixth shot, the gorilla gave up the ghost. The spot where he fell was two or three miles from the house I am living in, and people had to be fetched to carry the huge beast, yet by 9.30 a. m. he was brought to my door. He proved to be a good sized fellow, a male, but not nearly so large as the one whose skeleton I presented to the Derby Museum, but nearly, if not quite, as large as the fine specimen given by Mr. Duckworth to the same institution. Now, as the hunter was only out twice in search of a gorilla, and on the second occasion soon met with and shot one, not three miles from the sea, and close to a village, I am confirmed in my previously entertained opinion that gorillas are by no means so difficult to obtain as has been represented, especially here at Camma, during the rainy season, when the fruit of the Mbimo tree is ripe.

“R. B. N. WALKER.”

Mr. F. J. Jeffery, F.G.H.S., called attention to the proposed visit of the British Association to Liverpool in 1869, and suggested that it would be desirable to hold a Centenary Festival in commemoration of the births of the great men born in 1769, in conjunction with the visit, should the Association accept the invitation which had been sent; and seeing the names of illustrious foreigners which appear on the list, he proposed that the celebration should be international. Among the names mentioned were those of Wellington, Napoleon I., Sir T. Lawrence, Humboldt, Cuvier, Forsythe, the inventor of percussion caps; Arndt, the German poet; Marshals Soult and Ney, Rev. W. Jay, of Bath, Sir M. I. Brunel, and the younger Watt, the Engineers.

The following paper was then read :

## ON THE LIMITS OF GEOGRAPHICAL KNOWLEDGE IN THE ELIZABETHAN AGE.

BY JAMES BIRCHALL.

THE Elizabethan age was so prolific of oceanic discoveries, and the knowledge of the earth's surface in almost every degree of latitude was subject to such constant variation, that it must appear, at first sight, a somewhat paradoxical task, to determine limits which were apparently so uncertain, and which were being yearly extended. But, although the information which Europeans possessed of foreign countries was necessarily confined within the shifting bounds of maritime discovery, there existed certain established impediments, which absolutely kept within fixed limits, for a time, that geographical knowledge which, had it been free of these, must have enlarged itself as discoveries extended. It is, therefore, my object in this paper, not to dwell so much upon the question of how much of the earth's surface was known, or unknown,\* but rather to review the principles of Physical Geography as they were then understood, to note the methods of observation adopted by those who, by their travels, were favoured with opportunities of informing themselves of the extent and condition of other countries, and to examine the speculations of those who, not having such opportunities, or it being impossible to have them, sought to account by theory for the occurrence of the various phenomena which surrounded them.

\* It is proposed to investigate this question (chart making and chart knowledge) in a subsequent paper.

The age now brought under review, comprehending the sixteenth and first half of the seventeenth centuries, belongs to those rare periods in human history wherein the achievements of mankind in every department of human effort burn with heroic glow, and are productive of the most momentous revolutions. In this illustrious age, the European world combined in one grand and determined effort for freedom of thought and freedom of action, and for an enlarged arena worthy of the exercise of both. The deliverance from feudal servitude and theological restraint which then resulted awakened in men's minds those long dormant powers which presently had full scope; the speculative philosophy of the School-men was soon displaced by an ardent love of experiment and curiosity of observation, and new fields were eagerly explored for the discovery of new facts and new existences. A wonderful accession was thus made to the number of natural productions; and the sudden increase in the necessities of nations, which thence arose, gave such an impulse to commerce and the arts, that the love of gain also co-operated with the desire for intellectual progress, and numerous expeditions were equipped, and even lonely journeys made by daring adventurers, for the express purpose of opening out new markets, and tracing out new routes through countries which had not been traversed since the times of Marco Polo, and the brothers Zeni.

The necessity for extended geographical knowledge, which was thus experienced by merchants, led to the publication of numerous books of voyages, atlases, and other works on cosmography, and the maritime countries of Europe, with their interests involved in colonisation, felt bound to grant state encouragement to the study of geography by the appointment, as in Spain and the Netherlands, of royal geographers, whose duty it was to obtain all the most authentic



information concerning lands beyond the sea, and publish the same in charts for the use of navigators and traders.

Yet with all these inducements to promote the study of so important a subject, the advancements made in geographical science were scarcely perceptible; and it is an exceedingly singular fact, that while commercial success depends most materially upon the possession of an accurate knowledge of the earth's surface, there is no department of human inquiry which has made such slow advancement, or received an enlightened study at so late a stage of its history. For successive centuries, such scholars as Europe could boast placed childlike faith in the opinions of the ancient geographers, and the world at large accepted what its scholars taught. The Ptolemaic system of Cosmography was the belief of learned and unlearned even almost to our own day. This is unmistakeably shown in the map of the world, published by Speed in 1651. Around the two hemispheres is a series of pictorial diagrams, descriptive of the theories at that time entertained concerning the constitution of the universe, and certain terrestrial phenomena. In one of these, we have the Eudoxian system of Aristotle, and the Ptolemaic system, plainly set forth. According to these theories, which are practically one, the heavenly bodies were supposed to be set like gems in hollow orbs (or shells) composed of crystal, so transparent that no interior orb concealed from view the orbs which lay beyond. The sun and planets had each its separate orb; and beyond all was the *primum mobile*, the *first moveable heaven*, which revolved daily, from east to west, and carried along with it all the other orbs. Above the whole spread the *grand empyrean*, or *third heavens*, the abode of perpetual serenity.

The centre of this extraordinary celestial machinery was the great round world, set immoveable in the midst. "Thou hast made the round world so sure that it cannot be moved

at any time," was the Elizabethan translation of the Psalmist's words, the translators, as we may infer, from this and numerous other passages, being evident believers in the philosophy thus set forth. It is well known that Bacon maintained these opinions; and we have a curious illustration of them, in the Latin verse which the Westminster scholars set up on the mainmast of the ship in which Drake had navigated the world. "Sol nescit comitis, non memor esse sui" they wrote, "The sun himself could not forget his fellow traveller;" meaning thereby that Drake had, like the sun, made the circuit of the globe. So also Massinger, in his play of *The Duke of Milan*, when he would express utter disbelief, puts this exclamation in the mouth of Marcellia;

"If thou wouldst work  
Upon my weak credulity, tell me rather  
That the earth moves, the sun and stars stand still,  
The ocean keeps nor ebbs nor floods."

Our natural surprise, therefore, at the papal treatment of Galileo, who as early as 1610 was imprisoned for maintaining a contrary doctrine, so repugnant to the senses and the common interpretation of Scripture, ought to be considerably abated in presence of the universal belief. Later still, even, we find numerous passages in *Paradise Lost*, asserting the Ptolemaic principles, and especially in the well known lines in the eighth book, wherein Adam asks of Raphael the explanation of natural phenomena, and the poet enters into an elaborate argument upon the principles of the Ptolemaic and Copernican systems, apparently in doubt as to which is the home of truth.

In this diagram we also perceive another remarkable conception, entertained throughout the middle ages, and still existing in the Elizabethan age. This idea was derived from the *Geographia Nubriensis*, of Edrisi the Arabian, 1154, and

represented the world as consisting of half land and half water. The latter surrounds the former in a continued circuit, or zone, in which the earth floats like an egg in a basin of water. Absurd as these ideas are to us, to whom has been revealed the grand simplicity of nature, "Heaven's easy, artless, unencumbered plan," they are exceeded in absurdity by the views of Cosmas, an Egyptian monk of the sixth century, who, in order to refute the impious doctrines, as he deemed them, of those who taught that the world was a globe, maintained that it was a plain oblong, surrounded by an immense wall, which supported the firmament or azure vault of heaven. The succession of day and night was the effect of a great mountain in the northern part of the earth, behind which the sun concealed itself every evening.

With the exception of this curious fancy, however, the Aristotelian theory of the sphericity of the earth was generally held throughout the sixteenth century, like the other great principles of the Greek philosopher, whose doctrines alone were orthodox in philosophy, and the schools of the middle ages. His idea, indeed, that the coasts of Spain were not very far from those of India, must have startled many a slumbering thought in the minds of the reflective, and awakened in the adventurous a frequent longing for the means of testing its truth. And this must have been especially the case after the publication of the travels of Marco Polo, who had visited countries much further to the East than the limits assigned by Ptolemy to the Asiatic continent, and upon whose statements, Martin Behaim, royal geographer to John II., of Portugal, had represented in his globe, the coasts of Zipangu, or Japan, to be no further from Africa than a sixth of the earth's circumference. In this globe, as well as in the maps of Andrea Bianco, the Azores were placed between Africa and Zipangu, which tended still further to diminish, in popular estimation, the distance of open

ocean to be traversed by navigators. It is no part of the object of this paper to enter into any account of the discoveries of Columbus, or other American explorers ; but it may be mentioned that these ideas of the sphere, and of the supposed nearness of far distant countries, were the original stimulants to the famous series of voyages in discovery of the N. W. passage. Sebastian Cabot, in the report he made to the Papal Legate in Spain, distinctly states this ; “understanding,” he says, “by reason of the sphere, that if he should sail by way of North West, he should by a shorter tract come into India.”

The globularity of the earth was therefore an undisputed tenet in the sixteenth century, but the only knowledge of its motions was that derived from Ptolemy, whose hypothesis so readily explained to the senses all the phenomena then known, namely, the apparent diurnal motion of the stars, eclipses, and comets. With one exception, those phenomena, which can only be explained by the Copernican theory of terrestrial motions, were discovered long after the age now under review ; a circumstance which of itself sufficiently accounts for the slow reception of the principles of Copernicus, interfering, as they did, with so many prejudices, and incapable of that kind of proof which the world generally demands. This exceptional phenomenon was the extraordinary length of the Polar day and night at the solstices, which from the earliest times was the theme of wonder to travellers. Thus Pytheas of Marseilles, a Greek navigator, who flourished before the time of Alexander the Great, reported of Thule that, at the summer solstice, the sun did not set for four-and-twenty hours. Some centuries later, Tacitus writes—“In the furthest parts of Britain, the nights are so clear that you can hardly tell when daylight begins or ends ; and when the sky is not overcast with clouds, you may see all night long the light of the sun, which does not rise or

go down, but moves quite round." So also Marco Polo speaks of a country beyond Tartary, "which extends to the utmost bounds of the North, and is called the region of darkness, because during most part of the winter months the sun is invisible;" and further on, he mentions "the summer season, when they enjoy continual light."

The voyage of William Barentz, who was sent out by the Dutch government in 1594, to discover a N.E. passage to Cathay and India, affords the most remarkable instance during this period of the knowledge which Europeans possessed of the solstitial day and solstitial night. This navigator set sail in the spring of 1594, and arrived at Spitzbergen, which was then first discovered, in time to avail himself of the summer solstice, during which to prosecute his discoveries. After reaching Nova Zembla, he was compelled to return, but the ice had already closed in upon the expedition, and Barentz prepared to pass the winter in that dread abode of darkness and desolation. On the 4th of November, the last rays of the sun forsook them, and with these it was remarked as a singular fact, that the bears disappeared, and the white foxes came in great numbers. On the 27th of January, the entire disc of the sun was visible above the horizon, to the surprise of Barentz, who did not expect its appearance for a fortnight, though it appears that his calculation was a week in error. The obliquity of the ecliptic to the earth's equator was known from the ancient times, but whether this Polar phenomenon was further known to be the result of this obliquity is questionable. It cannot be asserted, indeed, of any age of the world's history, that men were unobservant of the various wonders which nature in her successive changes was constantly presenting to their wondering eyes; the Book of Nature was ever open to them, and all could see, though few could understand.

But unable as philosophers were, from their ignorance of

the true process of scientific investigation and of the instruments necessary to correct observation, to comprehend the natural phenomena of the seasons, and the planetary changes which they record, they were not inactive in their speculations concerning the physical constitution of the universe. Famous among those whose conjectures on this subject were best known in the sixteenth century, was Jordano Bruno, who published three works in the form of dialogues, professed to have been written in England, under the patronage of Leicester, Walsingham, and Sidney. In the first of these, "*La Cena de la Ceneri*," Jordano propounded a physical theory of the world. He adhered to Copernicus' theory of terrestrial motion, and despised gravitation as an absurd hypothesis, all natural motion being circular. He had some glimpse of the composition of motions, asserting that the earth had four simple movements, out of which one was compounded. In the second work, "*Della Causa Principio ed Uno*," Jordano propounded a system of Nature. The world was animated by an omnipresent, intelligent soul, which was the only physical agent, that called out the plant from the seed and matured the fruit; that lived in all things, though the things themselves might not seem to live. This soul was thus the first cause of every form that matter could assume; forms being only the accidents of matter. Form and matter were therefore like unto male and female. The first form and the first matter, and all the forms generated therefrom, made but one being—the infinite unchangeable universe in which everything existed, which was all things, and no one thing separately. The third work, "*Dell' Infinito Universo*," asserted the infinity of the universe and the plurality of worlds. The stars were suns, shining by their own light, and each had its revolving planets. To maintain these theories, however, was then a capital offence in the eyes of the Church, equally

with the profession of those of Copernicus, which few believed.

The great system which prevailed in the scientific world, during the seventeenth century, until the Newtonian philosophy gained undisputed preeminence, was the Cartesian theory of Descartes. Besides the matter which composed terrestrial bodies, this remarkable philosopher maintained the existence of two other kinds; one, very subtle, constituting the substance of the heavens, and the other, still more subtle, filling up the intervals not occupied by the first. The elementary atoms of these two ethereal substances, by perpetually rubbing against each other, caused an increase of particles, which, not being required to fill up vacuities, flowed towards the centre of the system, and became the sun. Round this centre the whole mass was whirled in a number of distinct vortices, each of which carried a planet along with it. Centrifugal motion impelled every particle to fly off from the centre; and in the origin of things, myriads of particles thus escaped beyond the system, but there formed a denser sphere, which prevented the escape of others which came after. The effect of these later particles endeavouring to escape was *light*.

The motion of the vortices in this theory was not reconcilable with the relation between the revolutionary periods and distances of the planets ascertained by Kepler, about the same time; but the hypothesis concerning the nature of light as a subtle ether, having a vorticose motion round the sun, so much ridiculed by the followers of Newton, became, in after years, a favourite speculation among scientific thinkers.

The grand cause which seems to have generated into mental life these remarkable systems of cosmography in the sixteenth and seventeenth centuries was doubtless the launching of the Copernican theory upon the philosophical world in 1543. That theory, attempting to explain the ordinary

natural phenomena by principles so apparently contradictory of the effects perceived, must have compelled scholars to pause and reflect, notwithstanding the contempt with which they first received it. Thus Tycho Brahe, in order to reconcile the apparent testimonies of sense and Scripture with the new theory,—which he could not altogether disprove, yet was unwilling to believe,—suggested a middle course, by supposing the five planets to move round the sun, and all these with the moon to move round the earth.

Comets, those harbingers of ill to the awe-struck world, were pronounced under the Aristotelian system to be simply meteors, generated below the orbit of the moon—a doctrine which had even Galileo for a disciple. But when the earth had ceased to be regarded as the centre of the universe, truer views began to be entertained of these also, and the appearance of one in 1577 induced Tycho to observe its path, and to ascertain that it went far beyond the lunar orbit, and even penetrated the supposed solid firmament which environed the stars, of Ptolemy's theory. And thirty years later, Grassi, the Jesuit, profiting by the Danish astronomer's calculation, ascertained their orbits to be vast ellipses, having the sun for their chief focus.

The knowledge of Gravitation, at a time when so much learning had to be surrendered as false, and so much that was new and strange demanded an acceptance, must have been subject to the same uncertainty of speculation. Under the system of Aristotle, it was impossible for such a theory to exist; but when the universe was despoiled of its orbs of crystal and the *primum mobile*, and the planets were pronounced to be globes, flying bird-like through space, some theory, which should explain by what influence they were bound together as a system, must have been felt to be a necessity. Yet Copernicus had no idea of this principle, and we have seen that Bruno, one of his earliest and most emi-



nent disciples, rejected it as an absurd hypothesis. On the other hand, it is exceedingly remarkable that the Arabians, in the middle ages, maintained a principle of universal attraction, which they professed to have derived from the writings of the Pythagorean disciples. Caswini, one of their geographers, thus asserted that the earth turned unceasingly; that it was suspended in the universe equally distant from all points, and that the firmament attracted it on all sides so as to maintain it in a perfect equilibrium.

The clearest conjectures in the Elizabethan age on this subject were propounded by Godwin, an Oxford student, in a work published by him in 1638, called "The Man in the Moon."

In this he gives an account of the supposed journey of one Domingo Gonzales to that planet, and distinctly states that the earth's attraction diminishes with the distance.

The Cartesian theory of vortices was entirely at variance with this grand principle, and we therefore find Descartes, the author of that theory, rejecting gravitation with contempt. To conceive this, he observes, "we must not only suppose that every portion of matter in the universe is animated, and animated by several different souls, which do not obstruct one another, but that those souls are intelligent, and even divine; that they may know what is going on in the most remote places, without any messenger to give them notice, and that they may exert their powers there." These remarks may appear to us very quaint, and even absurd, but it must be remembered that this was the style of thought and philosophical reasoning, in an age which was so barren of observed facts as that in which Descartes lived, whose mind, moreover, was more speculative than mathematical, more strongly tinged with poetic and romantic ideas of Nature, derived from a pseudo-scientific contemplation of the universe, than with the arguments and conclusions of strict philosophical investi-

gation. Superior to him in mathematical inquiries, was Blaise Pascal, to whom has been lately attributed the first actual discovery of the principle of gravitation, a statement, however, which has been exploded almost before it has had time to circulate through one half of the learned societies of Europe.

Another Englishman, who distinguished himself as a pioneer in the path of physico-geographical investigation, was Dr. Gilbert, physician to Queen Elizabeth and James I., and one of our earliest Copernicans. The magnetism of the earth was his own original hypothesis, for the truth of which he relied on the analogy of terrestrial phenomena to those exhibited by an artificial spherical magnet. His work on this subject was first published in the year 1600, and was entitled, *Of the Magnet, or Loadstone, and Magnetical bodies, and of that great Magnet, 'the Earth.'* In this treatise, he reviewed the history of all that had been observed and written on this subject before his time, by Harriot, Hues, Wright, Kendal, Norman, and Barlow, the latter of whom was the first who explained the use of the inclinatory for the purposes of navigation (1597). Gilbert then arranged the magnetic phenomena he had observed, with regard to attraction; the polarity of the needle, its variation and declination, and the use of the latter in finding latitude, according to the method previously laid down by Mr. Norman, but which Halley, in a subsequent age, proved to be a false calculation. This great discoverer, however, was mainly indebted to the researches of Gilbert, for the knowledge he acquired of the variations of the needle, and their application to latitude and longitude.

Immediately on the publication of Gilbert's work, observations were made by English navigators in support of his theory of terrestrial magnetism. In 1608, Henry Hudson, during the course of his second voyage round the North of Europe and Asia, made many interesting observations with

the dipping needle or inclinatory, and Captain Fox in the previous year, while sailing in Hudson's Straits, observed that the needle became sluggish or insensible; a phenomenon which he ascribed "to the sharpness of the air interposed between the needle and his attractive point." Before we leave this interesting point, it may be mentioned, as an instance of its importance to the navigator, that Columbus had almost lost the honour of being the discoverer of America, through his ignorance of it. As he sailed westward, he found the needle, instead of being true to the pole, gradually deviating more and more to the northwest, a circumstance which the mariners attributed to a loss of virtue in the compass, and therefore considered it a most decided reason why they should return home.

It thus appears that there were not wanting, in the Elizabethan age, men eager to observe, and bold to speculate—but the great desideratum was the knowledge of a correct method of observation. Before the inductive philosophy of Bacon found acceptance, it was impossible to attain this knowledge, for principles were laid down irrespective of observed facts; they were not established laws, the results of systematic observation, and ascertained phenomena, but mere theories and speculations. According to this scheme of human learning, the earth was fancifully divided into eighteen climates, which commenced at the Equinoctial line, and extended northward and southward to the limits at which the world was supposed to be rendered uninhabitable by the cold. These limits were arbitrarily fixed at the sixty-fifth degrees of latitude, beyond which lay "thrilling regions of thick ribbed ice," the exclusive abode of lost souls, condemned to hang there in "contorted chains of icicles."

When the voyages of the northern navigators began to penetrate into these dreary zones, such popular superstitions, so frequently alluded to by the poets and dramatists of the

day, must have been rapidly dispelled; but the artificial division of the globe into climates, and into habited and uninhabited regions, reveals to us that Elizabethan geographers had no knowledge of what we understand by the Fauna and Flora of a country. Aristotle's *History of Animals* still formed the foundation of their knowledge of Natural History; and although his fabulous animals were rejected by naturalists, they continued to place the hippopotamus among aquatic animals, and the bat among birds. The fauna of the countries round the Mediterranean were best known; but as the New World became further explored, the new animals it revealed, like the opossum, the manati, the guinea pig, the glutton and the armadillo were included in the chief works on zoology. The accounts of these, however, were so largely mixed with fable, and the tales of travellers were so extraordinary, that the term "geography" became synonymous with the expression, "the wonders of the world." The following provision among the regulations made by William of Wykeham, for the management of his college at Oxford, will illustrate this. "When in winter, on the occasion of any holiday, a fire is lighted for the fellows in the great hall, the fellows and the scholars may, after their dinner or their supper, amuse themselves in a suitable manner, in the great hall, with singing or reciting poetry, or with the chronicles of different kingdoms and the wonders of the world, and everything that befits the character of the clergy."

On such an evening, the travels of Marco Polo must have furnished marvels in abundance for the recreation of the fellows. His curious story of the fish in the lake of Geluchalat, which never made their appearance before the first day of Lent, and continued to abound till Easter Eve, after which they disappeared till the next arrival of the fasting season—all which they did to accommodate the pious monks of St. Lunardo, who had a convent in the vicinity. His

description, again, of the desert of Lop, on the north east of China, must have sent many a sensitive hearer trembling with fear to his lonely pallet. Speed fully adopts this description as accurate, in his map of China, inserting the following note where the desert is marked: "In the desert of Lop or Belgian, men are thought to be seduced by wonderful illusions and devilish spitting."

Another legend among these geographical marvels, which was an article of faith in the Elizabethan age, and had been handed down at least from generation to generation, was the existence of men "whose heads do grow beneath their shoulders," and of other races who had faces like dogs. The people of the island of Andaman, says Polo, "are a most brutish and savage race, having heads, eyes and teeth resembling those of the canine species." "The people of Budtan," said Ctesias, the contemporary of Xenophon, "are black, with the head and nails of a dog, and with tails." Compare these statements with Sir Walter Raleigh's account of the Acephali, whom he heard of, but did not see, in Guiana, dwelling on the banks of the river Arni. He does not doubt, he says, the fact of their existence, for "though it may be thought a mere fable, yet for mine own part" he observes, "I am resolved it is true, because every child in the provinces of Aromaca and Canuri affirm the same. They are called Ewaipanoma; they are reported to have their eyes in their shoulders, and their mouths in the middle of their breasts, and that a long train of hair groweth backward between their shoulders. . . . Such a nation was written of by Mandeville, whose reports were holden fables many years; and yet, since the East Indies were discovered, we find his relation true of such things as heretofore were incredible. . . . When I came to Cumana, in the West Indies, afterwards, by chance I spake with a Spaniard, dwelling not far from thence, a man of great travel, . . . who, being

esteemed a most honest man of his word, and in all things else, told me that he had seen many of them." Humboldt met with equally clear accounts of these monsters, from the natives of the American Llanos, who asserted that they had seen the Rayas, as they were then named; and he says further that he found it dangerous to doubt the veracity of his informants.

Keymis, the companion and friend of Raleigh, in a subsequent voyage he made to Guiana, also found, as he believed, another race of monsters, who had "eminent heads, like dogs, and lived in all the daytime in the sea;" and others called Pariagotos, who made themselves invulnerable by eating white stones, which were found in the mountain in which they dwelt.

While, therefore, such intellects as Raleigh not only circulated, but fully credited, such absurd fables concerning the natural history of man, we shall not be surprised that equally extraordinary accounts were given of animals. Thus Raleigh describes the Armadillo as having "*a white horn growing on his hinder parts, as big as a great hunting horn, which they use to wind instead of a trumpet.*"

Again, in the account of the three voyages of Barentz to the Arctic Ocean, we read that the adventurers found at Nova Zembla "a multitude of red geese, of which it was never known till this time where they hatched their eggs; so that some men have taken upon them to write that they sit upon trees in Scotland that hung over the water, and such eggs as fall from them down into the water become young geese, and swim there out of the water; but those that fall upon the land burst in sunder and are lost." It was near Nova Zembla that Thomas Hilles and Robert Rayner, two of the sailors in Hudson's second voyage to the North, 1608, saw a mermaid, which he thus describes. "One of our company, looking overboard, saw a mermaid, and calling up some of the com-

pany to see her, one more came up, and by that time she was close to the ship's side, looking earnestly on the men; a little after, a sea came and overturned her. From the navill upwards her backe and breasts were like a woman's (*as they say, that saw her*); her body as big as one of us; her skin very white, and long haire hanging downe behind, of colour blacke; in her going down they saw her tayle, which was like the tayle of a porposse, and speckled like a macrell." Hudson evidently was not so credulous as Raleigh; for while the latter, with his customary vehemence of expression, warrants the truth of the statements he makes, and anticipates with contempt the scoffs of the sceptical, Hudson cautiously relieves himself of any responsibility for the origin of the story, by adding, "as they say that saw." There is no circumstance in the lives of either of these famous men so pointedly characteristic of their respective and widely different tones of mind and thought.

The last illustration I give of the information concerning geographical fauna, collected by Elizabethan travellers, is taken from the account of Drake's voyage round the world. When his expedition reached the Island of Celebes, his men landed, and spent four weeks ashore repairing their ship. "The island was covered with woods, and amongst the trees, night by night, through the whole land, an infinite swarm of fiery worms did show themselves, flying in the air, whose bodies being no bigger than our common English flies make such a show and light, as if every twig and tree had been a burning candle. In this place breedeth also wonderful store of bats, as big as large hens; and, better than such ugly poultry, a kind of crayfish, of such a size that one was sufficient to satisfy four hungry men." These crayfish were evidently land crabs, and "they are" continues the account, "utter strangers to the sea, living always on the land, where they work themselves earths; or rather they dig huge caves

under the roots of the largest trees, where they lodge by companies together. Sometimes, when we came to take them, for want of other refuge, they would climb into the trees to hide themselves, where we were enforced to follow them."

From these and other examples which could be adduced, —for the voyages of Hakluyt, Purchas, and other collectors abound in them,—it is readily to be seen that while travellers were eager to collect facts, and extend the limits of human knowledge, they were as yet mere children in scientific observation; they gazed at everything with all that bewildered astonishment which marks the observations of childhood, exaggerating the mysteries of things which they saw but could not comprehend, and lending a credulous ear to every tale, which to them was always the more credible in proportion to the contrast it presented to their own experience of natural life. With all the facts and fables thus collected by so numerous a multitude of travellers, those who observed with any scientific perception, or with the object of classifying and arranging the knowledge they obtained, were few and far between. The first man who seems to have perceived a great typical uniformity in nature, was Belon, who travelled through Egypt and the Levant in the sixteenth century; and our own countrymen, Ray and Willoughby, at the close of the next century, were the first zoologists who made use of comparative anatomy. These two scholars, finding the history of nature very defective, agreed between themselves to travel through Europe, and reduce the several tribes of animals and plants to a method, and to give accurate descriptions of the several species, from a strict survey of them. They dissected every animal, of which they gave an account, and divided all animals into two classes; those with blood, breathing through lungs, and those without blood, breathing through gills. Their researches, however, do not belong to



the period now under review; but so much has been stated to show that, as their works were the standard of zoological information at the close of the seventeenth century, when the establishment of the Royal Society had marked an era in the history of scientific investigation, Elizabethan knowledge of this subject must have been very imperfect and obscure.

The science of botany, and its relation to geographical flora, appear to have been better understood than zoology. Attempts were made to acclimatise plants; and botanical gardens, containing the finest productions of Asia and America, were established in the chief cities of France and Italy before the end of the sixteenth century. The classification of plants according to their organs of fructification was generally adopted; the works of Gesner and Belon, and Dr. Turner's *New Herbal*, published between 1551 and 1568, being the chief authorities. Botanists, however, entertained very confused notions of the order of species of plants; they still relied more upon the works of the ancients than upon their own researches; they often made very bold assertions upon no other authority than simple theory; and those who travelled for the purpose of acquiring geographical knowledge, frequently gave the most fanciful accounts of the plants they had seen in foreign lands.

I have now passed under review some of the salient points in the principles of physical geography, as they were understood in the Elizabethan age. From all that has been advanced, it will I think be seen that the limits which confined the knowledge of these may be emphatically described in these two words, credulity and speculation. Where human intellect was unable to penetrate through the mists which shrouded the causes of natural phenomena from men's bewildered understanding, it was not afraid to supply the lack of knowledge with the boldest and most extraordinary conjectures. Side by side with this eagerness to discover that

which was unknown, there existed a pertinacious attachment to old opinions—an almost unconquerable reluctance to surrender the teachings, false as they were, which former ages had bequeathed. This is one of the paradoxes of this age of paradoxes—an extreme deference to authority, yet an avidity for new theories; an unquestioning faith in the veracity of ancient fables, yet a persistent opposition to the truth of principles which all natural phenomena, then and since observed, have established as eternally true. This remarkable paradox is accountable only by the fact that the Elizabethan age was one of transición, in philosophy, as well as in politics and religious doctrines. Old modes of thought and fashions of reasoning were gradually fading away, and being replaced by new arguments, and a keener perception of the essence of things. Every department of human inquiry was being sifted and questioned; and just as men's minds were prone, or otherwise, to receive deductions, there arose the two great sections,—those whose finer sense convinced, or love of novelty induced them to believe every new speculation, every fresh account of travellers; and those with whom an implicit belief in the teachings of their fathers was a cherished sentiment, and who therefore lent a ready ear to the most absurd stories, when they contributed to the confirmation of the ancient legends; but who, on the other hand, resolutely rejected a theory, merely because it was destructive of all previously received ideas on the same subject. These appear to me to be plain and fair conclusions, from the various facts and speculations I have described in this paper, and I feel that they are capable of being very much further developed, did leisure admit of my entering into so important a subject.

## SECOND ORDINARY MEETING.

ROYAL INSTITUTION, NOVEMBER 4th, 1867.

The REV. C. D. GINSBURG, LL.D., PRESIDENT,  
in the Chair.

Messrs. J. Fenwick Allen, and J. Bramwell, were unanimously elected ordinary members.

The President then referred to the loss which the Society has sustained in the death of Dr. Birkenhead, expressing his hope that some member of the Society, intimately acquainted with Dr. Birkenhead, would prepare a short notice of his life, to appear in the Society's *Proceedings*.\*

Mr. Astrup Cariss then read the preliminary portion of a paper on

ORGANISATION IN PHILANTHROPIC WORK, WITH  
SUGGESTIONS HAVING SPECIAL REFERENCE TO  
LIVERPOOL.

\* A Memoir of Dr. Birkenhead will appear in the next annual Report of the Society.

### THIRD ORDINARY MEETING.

ROYAL INSTITUTION, November 18th, 1867.

The Rev. H. H. HIGGINS, M.A., VICE-PRESIDENT,  
in the Chair.

Mr. H. W. Biggs was unanimously elected an Ordinary Member.

Mr. T. T. Moore exhibited a fine stuffed specimen of the Tatou, or giant Armadillo (*Priodontesgigas*), lately added to the Free Public Museum.

The Rev. H. H. Higgins made some meteorological observations illustrative of the old adage—

The evening red, and the morning grey,  
Are two fine signs of one fine day.

Mr. B. L. Benas exhibited a copper coin, about 3lb. weight avoirdupoise, of the reign of Frederick, King of Sweden, 1745, which was issued because of the scarcity of silver and gold, and passed current for one dollar.

The following Paper was then read :—

## ON CRIMINAL RESPONSIBILITY.

By EWING WHITTLE, M.D., M.R.I.A.,

LECTURER ON MEDICAL JURISPRUDENCE TO THE LIVERPOOL ROYAL  
INFIRMARY SCHOOL OF MEDICINE.

I VENTURE to bring the subject of criminal responsibility before this Society, in the hope of directing attention to certain anomalies that exist in, or rather between the theory and the practice of, the law of England on the subject. Broadly stated, the theory of the law is, that every man is responsible for his actions, unless at the time of committing any offence he is of unsound mind to an extent which renders him incapable of judging between right and wrong.

Now, if we turn to the practice of the courts, we shall find that this theory is continually set aside; for instance, we find cases of persons arraigned on the charge of committing atrocious crimes, who are perfectly aware of the wickedness of the act, and who are nevertheless acquitted on the ground of insanity on very meagre evidence; on the other hand, we have similar cases, in which, notwithstanding the strongest evidence to show the prisoner's insanity, he has been convicted and sentenced, being held responsible for his crime to the fullest extent; as an example of the first, I will instance the case of Mary Cullen, who was indicted at the Wexford Summer Assizes, 1846, for the murder of her brother, whom she had poisoned by arsenic, put into a mess of porridge; four persons who partook of the porridge died. The prisoner was acquitted on the plea of *moral insanity*.

On this case, Dr. Geoghegan, of Dublin, remarks, "no

indication of mental unsoundness was discoverable on careful examination, either by the physician to the gaol or by myself, nor (as I am informed by a late visitant of the lunatic asylum) has the prisoner since shown any signs of insanity" (written in 1851). "If not traceable to other influence, the crime may have been committed under that condition of moral perversity not uncommonly observed in the hysteric state. Whether such disturbance of the affective *faculties* only should absolve from criminal responsibility has been lately the subject of much and subtle discussion amongst psychologists; nor is the question as yet satisfactorily adjusted." Side by side with this case, I may allude to that of Oxford, who is even now confined for life as insane, on account of having fired a pistol at her Majesty many years ago; the proof of insanity in his case was of a very meagre character: the real cause of his acquittal on the ground of insanity, being evidently the unwillingness of the jury to consign to the gallows a weak-minded and vain young man, carried away by a morbid desire for notoriety and attempting a great crime, which happily was unattended by any serious consequences except to himself. In opposition to these cases, I will now instance the cases of the wretched man Jeffries, and of the man Clarke, who in 1862 murdered the tax-collector in Newcastle-on-Tyne. Jeffries, without being in any respect insane intellectually, appears to have been driven to murder his child under the pressure of a persistent impulse, which at last became irresistible. He was condemned and executed. Clarke, of Newcastle, though admitted to be insane, was convicted, and would have been executed but for the energetic action of the public and the pressure made on the Home Office.

The point which I seek to establish by these cases is, that the English law is defective, in not recognising degrees of responsibility; I hold that we have frequently cases of

criminals who have the power to a certain extent, but to a *certain extent* only, of resisting the promptings to crime ; we have a familiar example of this condition of mind in suicides, who have long been oppressed by the persisting impulse to commit self-destruction ; who have long fought against, and even taken precautions against it, such as requesting friends to have razors and other things, which they might use for the purpose of self-destruction, removed out of their way ; and yet these very people are in some cases carried away by an impulse which at last becomes absolutely beyond their control, and they consummate the act of self-destruction, perhaps tempted by the accidental presence of a razor, a rope, or a pool of water. Now I maintain the proposition, that there frequently is in some criminals the same partial control over their impulses to commit crimes, even murder ; that this partial control is often successful ; then it never comes before the public ; in other cases the struggling will is overpowered by the morbid impulse, and the crime is committed. I will briefly cite one case in illustration of this point. A young woman was attending an old lady as half nurse and half companion ; she was for the most part employed in reading to her, chiefly tales of horror, or newspaper accounts of murders. After some time she became affected with a desire to strangle the old woman ; there was no offence taken by her, no cause of quarrel, not the shadow of a motive ; yet she felt this impulse growing upon her to such a degree, that at last she fled to an asylum, told the circumstances, and begged to be taken in. It was found that she was suffering from derangement of the digestive organs, consequent on her close attention to the old lady, but there was no mental affection whatever. She completely recovered in a short time. Place in this young woman's stead, a person of less energetic will, and the denouement would, in all probability, have been the commission of a horrible crime, as

without meaning as the wildest act of any maniac. These are the sort of cases in which I think it would be wise in the law to recognise a degree of minor responsibility. This principle in criminal law is not a novelty. It is recognised both by the Prussian common law, and the Austrian penal regulations. In French law, though not avowedly admitted, the principle is accepted in their verdicts of *extenuating circumstances*. It may be said that the English law does recognise degrees of criminality, in its distinction between murder and manslaughter; true, it does so, but these are degrees in criminality, and not in responsibility; but if murder, arson or theft is committed, the criminal is assumed by the law to be sane, and consequently fully responsible for his acts; if the prisoner be defended on the ground of insanity, it is for the defence to prove, to the satisfaction of the court and jury, that the prisoner was so far of unsound mind as not to be able to distinguish right from wrong; the practice generally is for the court to be satisfied if it can be proved that the prisoner is the subject of delusion. The consequence is that very vicious prisoners are sometimes acquitted, on the ground of insanity, and so escape all punishment for their crime, except the loss of their liberty; while, on the other hand, prisoners have been executed who, though not proved to be intellectually insane, may have been as incapable of resisting the impulse to murder as a wild animal is to resist the instinct which impels it to seize upon its prey. It is difficult to give an instance of these cases, for after the man is hanged, it is then too late to prove his insanity. But in the case of Dove, who was hanged for poisoning his wife with strychnine, we have an instance of a man, whose intellectual condition was not much above that of an idiot, and whose moral faculties seemed wholly undeveloped, and who seemed to be led to poison his wife, merely by hearing the gossip in public houses about Palmer's murders,



and, in committing the crime, being, apparently, as little actuated by mind as a monkey is in playing any of its mischievous tricks. Now, though it be necessary that such a wretch should be confined for life,—and I think useful, that he should also be subjected to other punishment, judiciously applied,—I think it neither tends to the edification nor advantage of society that such a wretch should be hanged as a criminal. The adoption of this principle of limited responsibility in law, would involve to some extent, the recognition of moral insanity as an actual disease: that it is in any sense a special disease, is, I admit, denied by very high authorities; among others by Caspar, who argues that crimes of this kind are either caused by a high degree of depravity, or that the criminal is really insane, and driven to commit the crime either from excited fancy, or from being carried away by a fixed idea. He cites the case of a lady, who was tormented for a long time by the fixed idea that she must kill her governess, a lady with whom both she and all the family were on terms of the closest intimacy and affection. By Caspar's advice, this lady was taken on a lengthened tour through France and Italy, away from the governess: she returned home quite well, cured of her fixed idea, or of her moral insanity, whichever you choose to call it. Caspar states that she was throughout perfectly free from disease, either bodily or mentally; but I think most persons will agree with me that this fixed idea indicated for the time a diseased condition of the moral faculties.

A further argument may be derived from the fact, that moral is generally one of the earliest symptoms of intellectual derangement. I met, in my own practice, with a case in which a woman made several attempts to murder her children; she showed no symptom of intellectual derangement; she was confined in an asylum for a short period, but

continued so well that at the end of three months she was discharged. She continued well for about three years, and then became insane, and in a few weeks from the commencement of the attack she committed suicide. In this case the diseased condition of the affective faculties, in the first instance, was the primary manifestation of what ultimately proved to be complete insanity. We have, besides, good evidence to show that this affection sometimes exists in a violent degree associated with bodily disorder, and that in these cases it has a very close analogy with epilepsy. Reil thus describes such a case: "the paroxysm generally begins with all kinds of corporeal phenomena, a pressure exists at the pit of the stomach, shuddering through the whole body, the tongue is loaded, there is a sensation of burning heat in the bowels, the heat rises upwards to the chest, neck or head, there is a singing and buzzing in the ears, the patient often warns those about him, and entreats to be prevented from doing mischief, the countenance becomes flushed, the arteries of the head and neck throb violently, at length the excitement extends to the brain, and at this moment arises the blind irresistible impulse to murder, commit suicide, arson, or some other outrageous act, just as epilepsy ensues when its preliminary *aura* has reached the brain."

I will now proceed to give some heads of the history of a lunatic, whose disease for many years was solely characterised by moral perversity, and a desire to shed blood, there being so little intellectual derangement that, during these years, he pursued the different occupations of a joiner, a printer, a schoolmaster and a publisher; he was afterwards, for twenty years, the most remarkable and the most dangerous inmate of the Royal Edinburgh Asylum. The first symptoms of derangement which he showed, were an uncommon degree of querulousness, and the summoning of boys and others to the

police court, on frivolous charges : on these charges being dismissed, he became impressed with the idea that he was treated with injustice, and that the magistrates and the public in general were combined against him ; he frequently gave utterance to violent threats, and at last began to collect arms, and also to fortify his house against the police ; as he felt instinctively that his proceedings were likely to bring upon him a visit from those officials. On one occasion he said "that, if he could just get blood shed, he would be satisfied, but that he must kill somebody."

After being confined for short periods and at considerable intervals in two asylums, he was finally committed as a dangerous lunatic in 1841, he being then about 53 years of age. Two months after he made a murderous attack on the doctor with a shoe-maker's knife. He was then removed for greater security to Morningside Asylum, where the superintendent treated him with great kindness and consideration ; he was granted as much freedom within the walls as was consistent with his safe custody, was allowed writing materials for making out a detailed history of his case ; his taste for music was encouraged, and he was allowed to conduct the psalmody at morning prayers. At first this treatment seemed beneficial, and, though still vowing vengeance against his enemies in general, he used no threats against the officials of the aslyum ; however, after about a year, he began to direct his threats chiefly against Dr. Mackinnon and his assistant, both of whom he declared he would murder. Accordingly he was more carefully watched, but withal he managed to pick up a rusty piece of iron about the ground ; this he secretly fashioned into a sort of dagger, and on one occasion that the doctor happened to enter the ward, the attendant being absent, Smith rushed upon him and stabbed him in the back. Dr. Douglas, the assistant physician, came to the rescue, and he too was severely

wounded: though there were many wounds, none of them were dangerous. Smith always gloried in this murderous attack, and lamented that he had not been more successful; he also told afterwards that many times, when Dr. Mackinnon was conducting morning prayers, and he was sitting near him as precentor, he could scarcely keep from rising and braining him with the chair he was sitting on. After this he made many violent attacks upon the attendants; one I will instance, on account of the remarkable amount of cunning which he displayed; he picked up some cuttings of lead, which had been dropped by some workmen doing repairs; these pieces of lead he kneaded into a ball, and with this, by the aid of bits of string, shoe laces, and scraps of handkerchief, he contrived to make a heavy life-preserver. As he was closely watched, the secret fabrication of this weapon must have occupied him for many months; when the weapon was ready for use, Smith stationed himself behind the door of his room, quietly waiting for the entrance of the night visitor; as the man opened the door, Smith put his foot against it so as to let it only half open; the man upon this naturally leaned forward, to see what prevented the door opening, on which Smith, calculating on the movement, struck him a heavy blow on the head with the weapon. The man, though badly hurt, succeeded in overpowering him. He made many such attempts; on one occasion, he gave notice that on the 12th of the following month he would kill one of his attendants. Such was the terror inspired by this threat, from the perseverance, cunning, and ferocity which it was known he would use to fulfil his purpose, that it became necessary to have recourse to personal restraint. He continued in this state for many years, his mental powers gradually deteriorating, but always manifesting a persistent and unquenchable desire for revenge and blood. If out of doors Smith had consummated any of these crimes which he

attempted in the asylum, he would have been held responsible to the fullest extent, as knowing right from wrong, which he clearly was fully able to discriminate.

Dr. Skae relates the case of a woman, who came to the asylum to consult him; she said that every day, as soon as her household work was over, and she had nothing to occupy her attention, she was seized with an almost irresistible desire to murder her children. She lamented the horrible feeling, and could in no way explain it, for she loved them tenderly, but was obliged daily to leave them in the house, and walk up and down before the door, till her husband returned from his work, lest the murderous impulse should prove too strong for her if she remained beside them.

I take from Esquirol, a case "in which fits of homicidal insanity, succeeded to regularly recurring epileptic attacks. From his eighth year he was subject to epileptic fits; at 25 his disease changed in character; instead of fits, he was at intervals seized with an irresistible desire to commit murder; he had sometimes a presentiment for some hours before, and earnestly begged to be bound with chains, lest he should commit some crime. He said, when it takes me, I must kill, I must strangle, were it only an infant; his father and mother, whom he tenderly loved, were the first victims of these attacks; during the fit he retains the consciousness of his own existence, and knows perfectly that in committing murder he is guilty of a crime. The fit lasts from one to two days; when it is over, he says, Release me; alas, I have suffered greatly, but I have got out of it well, since I have killed no one."

W. Gilbert, a contributor to *Good Words*, argues that, among the criminal classes, there are instances of this kind, and he leans to the opinion that they are of the character of demoniacal possession. It is a curious fact that many of

these criminals speak of themselves as being possessed. A lady visitor to Millbank prison, describes a woman subject to these attacks, who, the night before, in a paroxysm of unprovoked fury, had broken her iron bedstead to pieces. When asked "how she possibly could have strength to do it," her reply was, "Oh, ma'am, I did it easily then, but I could not do it now; when the devil is in me, I could break up one twice as strong as that." Another would tear away the iron railings out of the fastenings in the stone steps, and, when confined in a dark cell, would tear up the flooring with her hands; she was always aware of the approach of an attack, and, when not suffering from the paroxysm, was generally a quiet well-conducted person.

Another girl, about twenty years of age, is given as an instance; she had been in prison nineteen times since she was 17, all for violence of temper and unprovoked assaults of an outrageous character; she was of good moral character, and quiet and well-behaved when not in one of her paroxysms; without any provocation she would commit the most outrageous acts of violence, and scream in her cell for hours together; when remonstrated with, she would say, "I feel I can't be good, the devil is in me to-day." In all these cases, no trace of intellectual derangement can be detected.

This writer gives an instance of an eminent clergyman, who was for years tormented by an inclination to murder his own child, a little girl, whom he passionately loved; he succeeded in curing himself of this feeling, by having resort to earnest prayer, always recurring to prayer whenever he was visited by the evil suggestion. This is a striking instance, in an educated man, of the disease of the emotional faculty, being cured by the training of, and the judicious exercise of the faculty of will. The wise exercise of the judgment in this case, proving conclusively the absence of any intellectual aberration.

To multiply cases would be only wearisome, so I proceed to consider the consequences which attend the anomalies in law and practice that I have endeavoured to set clearly before you. The first evil effect on society is, that whenever a great crime is committed, there is immediately a strong effort made to establish the insanity of the prisoner; all who are opposed to capital punishment join in this effort, as being the only chance of averting what they consider a public scandal; all those (particularly medical men) who hold strong opinions upon the bad policy of executing men of weak minds, put forth their strength on these occasions; on the other hand, the fourth estate and the strict legalists clamour against the prejudices of the MAD DOCTORS; and the result is, that the course of justice becomes scandalised, and is not unfrequently perverted. We have had a notable instance of this lately in the case of the wretched foreigner Bordier, who was executed for the murder of his paramour; a strong feeling was excited in his favour on this ground, a feeling to which Professor Laycock gave the weight of his opinion, and to which Dr. Wood, of Bethlehem, in some measure leaned, though he does not pretend to say that he considered Bordier irresponsible; he says, "I believe the great majority of insane persons are in a certain sense responsible. This is no matter of opinion, it is the unanimous conviction of every medical man who has had anything to do with the insane, that the vast majority know the difference between right and wrong; and it is the possession of this knowledge, and the consequent responsibility which it involves, which enables us to treat them as rational beings, and to exercise necessary control, without recourse to those repressive means which were believed to be essential, when insane persons were looked upon as necessarily irrational and irresponsible."

I do not believe that there were any good grounds for urging the plea of insanity in Bordier's case; jealousy appeared to be the exciting cause, and there seems to have been no reason to doubt that he was ardently attached to his unfortunate victim; he also suffered from a depressing physical ailment, which might to a certain degree have made him irritable, irascible, and less able to govern his passions; but, though this argument was insufficient to establish the plea of insanity, there were I think elements in his case which might have justified the admission of a minor degree of responsibility: 1. the absence of adequate motive; 2. his weak state of bodily health; 3. his imperfect education, evidenced by the total absence of moral training; and, finally, the probably low development of his moral faculties.

Whatever different opinions may be entertained about this case, all must admit that these discussions, continually recurring, tend to throw great discredit on the administration of our criminal law.

The cases and the arguments that I have laid before the Society will warrant, I believe, the following conclusions:—

1. That the common dictum of lawyers "that the power or capability of distinguishing between right and wrong, on the part of the criminal, should be the sole test of responsibility" is erroneous, and founded on ignorance of the true nature of mental disease.

2. That the legal idea, "that if it be proved that a criminal has delusions, it should be assumed that he does not know the difference between right and wrong," is also founded on error.

3. That, owing to the prevalence of the above erroneous ideas, insane criminals have been cruelly executed; and, *vice*



*versâ*, that great criminals have been sometimes acquitted on insufficient grounds.

4. That the administration of the criminal law is not infrequently scandalised, on the one hand, by the *summum jus* being harshly enforced against criminals of weak or impaired intellect; and, on the other hand, by atrocious criminals escaping the punishment due to their crimes, through the sympathy of a prejudiced jury, or the easiness of the Home Office under the pressure of prejudiced philanthropy.

5. That moral insanity should be recognised as a diseased condition, and as such entitling the criminal to be held responsible in a minor degree: (the degree of this responsibility to be determined by the court, with medical assistance, rather than by the jury.)

6. The admission of degrees of responsibility generally, in dealing with crimes of all sorts.

Finally, it is necessary to say something on the subject of medical testimony. Unless the mode of laying medical evidence before our courts be completely changed, it would be hopeless to carry out the reforms which this paper suggests. You are aware that the present custom is for either side to bring forward one or more medical men, more or less eminent, as the case may be, to speak to the medical aspects of the case, on behalf of either side: and it almost invariably happens that the court and the jury have to determine between the conflicting medical views advanced on either side, which often confuse them so much, that, not infrequently, the medical evidence is virtually ignored, and the case decided on its non-medical aspects. You will easily understand that the introduction of the principle of, what I may call, limited responsibility would vastly increase this confusion.

It would be foreign to the subject of this paper to attempt to explain fully the causes which lead to so much confusion in the matter of medical evidence; the fact is generally admitted and lamented by the profession, while it is often a subject of ridicule with the public. I will merely observe, that a medical man, brought into court by any particular party, will be naturally biassed in his favour, and his opinion be perhaps warped, though he may not himself be conscious of it. The remedy which I would suggest for this evil would be the adoption of the Prussian system of applying medical testimony to the elucidation of truth in all legal inquiries. By this system, all medical questions are referred to one or more medical men, who make a full report on the case, stating minutely, in language as free as possible from technical terms, their opinion of the medico-legal aspects of the case; also the grounds on which this opinion has been formed; and in some cases the process of investigation, or the train of reasoning on which their conclusions are based, are given in full detail. On these data the court and the jury ground their judgment on the medico-legal aspect of the case, and, if they think it necessary, examine the witnesses, *viva voce*.

The difference between the present British system and the Prussian being virtually this: by the British system, each party to the suit, whether the case be criminal or civil, has the medical features of the case, which appear to favour their own plea, placed in as strong a light as possible before the Court, at the same time keeping back any feature which militates against them: the court and jury being left to sift, as well as they can, the truth out of a mass of conflicting evidence and clashing theories, too often extemporised for the express purpose of confusing the jury, and preventing their giving due weight to the really salient points in the medical evidence. On the contrary, by the Prussian system,

the medical aspects of the case are carefully sifted by the medical referees; the wheat is separated from the chaff, and what is of value to the issue is gleaned, and presented to the court in such a state, that both judge and jury can appreciate it, and accord to it its true value along with any other evidence in the case.

Lastly, one word as to an objection, which, it strikes me, is very likely to be made, to the principles which I have endeavoured to enunciate in this paper; that is, that these principles tend towards the abolition of capital punishment. To introduce this element into the discussion, would be rather foreign to the subject of the paper; but in anticipation of such an objection being made, I merely wish to observe, that I am prepared to admit the justice of such an impeachment, but hold notwithstanding that the principles which I have now laid before you, are sound and well worthy of adoption.\*

\* While the foregoing article was in the hands of the printer, a medical friend has furnished me with the particulars of two cases which have been lately under his care, and which appear to him to corroborate strongly some of the views that I have put forward. One is that of a young man who is not long married, and who was for some time tormented by a persistent suggestion that he should murder his wife, to whom at the same time he was most tenderly attached; he had always been well conducted, and had by his good conduct gradually worked himself from an humble beginning into a very respectable position; he was of a religious turn of mind, and much given to reading. The idea first arose in his mind in this way: he happened to be reading what is called a sensation novel, being at the time rather in depressed spirits, and came upon a passage in which a wife-murder was described. The idea occurred to him, Could it be possible that he should do such a thing? He immediately shut the book and endeavoured to shake off the feeling; nevertheless he was continually tormented by the suggestion; he had recourse to earnest prayer; this had a good effect for the time, but the fixed idea still grew upon him, and in all probability a horrible *denouement* would have resulted, if he had not been placed under careful medical advice and treatment. By these means he became quite restored to perfect health. Now all the time that he was pursued by this morbid idea, he was in intellect perfectly sane; he attended to all the details of an active employment; he knew perfectly well that the action, if committed, would be a great crime, and that if he had been carried away by an irresistible impulse, and had committed the offence, he would, according to law, have been hanged. This is a well-marked example of true moral insanity; the intellect was perfect, but the moral faculty of self-control was diseased; in the

and he recovered completely, without ever manifesting any symptom of intellectual derangement.

The other case was that of a lady, who, having been married very young, after having several children, got into a weak state of bodily health; then she began to treat her children capriciously, to call them reproachful names, for which she would directly after express her regret, and burst into tears. At this time there was no intellectual derangement; but gradually this became manifested. In this instance the moral disease occurs as a forerunner of the mental affection.

These two cases illustrate forcibly what I have set forth, as to the distinction which should be drawn between moral depravity and moral insanity.

## FOURTH ORDINARY MEETING.

ROYAL INSTITUTION, 2nd December, 1867.

The Rev. C. D. GINSBURG, LL.D., PRESIDENT,  
in the Chair.

The Rev. Walton Lowe Clay, M.A., was unanimously elected an Ordinary Member.

Mr. Morton, F.G.S., exhibited a specimen of *Ammonites oxynotus*, from the lias formation of Gloucester, remarkable on account of its being converted into iron pyrites, and showing the original thickness of the shell.

The following Paper was then read :—

## ON CERTAIN CONTRADICTORY OR ABNORMAL PHENOMENA OF THE AGE.

BY THE REV. J. S. JONES.

HARDLY second in importance to the memorable precept, "know thyself," would be the counsel to "know thine age." To see, in due light and proportion, "the age and body of the time, its form and pressure," if it will not add to our knowledge of ourselves, will contribute to our power to use ourselves for the common good.

I have ventured to put together some thoughts concerning certain characteristics of this age, which, amongst others, afford matter for either simple remark, as noteworthy, speculation, as interesting, or reflection, as important.

None of these, perhaps, are more remarkable than the coincidence of *Luxury* and *Energy*. Whatever dangers are incident to a luxurious civilisation are ours in an unprecedented degree. Armies of conquest and armies of circumstance have given us empire. An unique history and education have given us power. Natural advantages, utilized by strong heads and hands, have given us wealth. A visit to an International Exhibition, or the Crystal Palace, would fill a citizen of any other age with wonder at the resources which could create, and the industry which could produce, treasures so infinite for the use and enjoyment of a multitude so vast. And, appalling as the contrast would be when he saw the darker side of the picture, the contrast itself would derive much of its suggestiveness and sad-

ness from the wide diffusion of those very results of wealth, out of the want or misuse of which the misery would be seen to grow. And these material facts would be seen to be but the indices of deeper ones ; of a growth of refinement in the minds of those who asked for, and the hand and brain of those who produced, these needs or adornments of home. And the observer would perhaps fear that with the special skill of the creator, and the growing comfort and complacency of the possessor, attenuation and effeminacy might come. And so has it generally been. The moralist dwells with unction, and the philanthropist with something like despair, upon the spectacle of states mounting vigorously the hill of prosperity, only to drag the device "excelsior" listlessly down the sunny slopes of the other side. Antony in the arms of Cleopatra is a type, as well as a history. The career of rude independence is run by a race in youth, and the honours of victory won in manhood, only to be followed by inglorious age. It would be, indeed, a sad decree of fate, if the stream of national life, springing from a rocky cradle, strengthening and deepening in its course, till able at length even to struggle with the sea, must disperse at last into shallows among sheltered vales, and grow stagnant, and dry away.

But if Macaulay's New Zealander is inevitable, he will not, judging by present appearances, owe his picturesque sketch to a degenerate race having lapsed into effeminacy. Fops and idlers there will always be : vices will cling to the skirts of civilisation, and lay claim, sometimes only too justly, to be its offspring. But we are proving that civilisation may be strong, and we will not believe but it may be pure. The great struggle in America has revealed an unsuspected capacity in this age for toil and sacrifice. Its history would be a hundred *Iliads*. It had, it is true, its hardy Western elements, and the adventurous Texan

or Kansas man contributed his part. But the Southern fire burst the silken bonds of Southern luxury; and the studious halls and quiet homes, as well as the farms and stores, of cultivated New England sent forth the ruddy and the pale into the ranks of war; while women, tenderly cherished and delicately framed, gave themselves and not seldom their lives to the work. And though we may hope to be spared the proof of what our volunteer army is capable of, we have no reason to fear that advanced civilisation has slain the Titan within us. What may not yet be accomplished by a race which courts the toils of war, that it may enjoy the fruits of peace; which adds the vigour of Rome republican to the wealth and comfort of Rome imperial; which, having a literature and arts of which it has no cause to be ashamed, bids its students contend in manly exercises; whose aristocracy wrestle with its democracy for the prizes of faithful service of the common land? Strong and successful, industrious and refined, there is no manifest reason why it should not be Rome and Macedon, Athens and Venice in one.

Another characteristic of the age is to theologians of course of especial interest. If any one were to describe the age as an age of inquiry, few would be disposed to dispute the definition. But it would probably be almost as correct to describe it as an age of faith. Faith and enquiry are the two characteristic words. I should not call the age either a credulous or a sceptical one. Examples of egregious credulity we have undoubtedly seen, but they are partial and ephemeral, and only in an age in which there is faith are such diseases of credulity possible. The age which succeeded the Revolution was one of religious repose, but also of religious stagnation. The reaction of the tremendous struggle of two centuries, a struggle in which politics and religion were closely identified, was a languor from which for generations



men could not be permanently roused. Theology fell asleep in its pew, with its Tate and Brady on its knee. The sluggish acquiescence of the eighteenth century was not faith, which stands upon old foundations, not even credulity, which is easily tempted to seek new. Nor was the attitude of mind which stood apart from it, enquiry. Scepticism was at least as dogmatic as theology. *Non credo* was intoned in unison with a confidence, which, but for its coldness, might have challenged the name of zeal. The hesitancies of this age are better, if only because they are hesitancies. Doubt is easier than enquiry, while it implies more, for it implies that you have enquired, and have arrived at a sort of result, the result viz., of seeing reason to doubt if such and such evidence is sufficient. If a judge says he doubts, he does not mean that he has no opinion, but that he has an opinion, the consequence of diligent analysis. The difference between the scepticism—using the word conventionally—of this age, and the scepticism of that, is, I hope, and as at present advised think, that there was then a pre-disposition to disbelief, and the wish to find reasons; now, a pre-disposition to faith, with a hesitancy—for which the friends of faith may in some degree be responsible—whether the reasons for faith are adequate. And thus the source of the doubts of the age is, in a measure, its religiousness, i. e., more people doubt and express doubts, because more people desire to believe, and are asking on what grounds their belief is challenged. Those who once gave up religion as a hopeless entanglement, or superciliously acquiesced in it as a politic institution, or contemptuously left it alone, are putting forth feelers after faith. There is certainly, as might be expected, a vein of cynicism in our social geology, but happily it seems generally found in alliance with want of faith in humanity, as much as in God; regarding philanthropy as a profession, and earnestness and goodness as harmless phenomena. Most of

the hesitancy as to faith, which is truly human, is reverent. Symptoms are encouraging or disheartening, and suggest hope or dismay, according as they accompany the advent or the retirement of disease. The same phenomena, which in one age would argue declension, in another would imply advance. The same thoughts and words, which would be alarming if they indicated a decline from faith, are hopeful if they shew a grasping after it. Even secularism is better than the scepticism of the age of Voltaire or Hume. It says "not proven" where that denied, and pleads for humanity in one world, where that ignored it in both. Holyoake is the most consistent secularist, because he is the least aggressive.

So that, remarkable as the coincidence of faith and enquiry appears, they are probably mutually helpful. The boldest enquiry, if honest, will strengthen faith somewhere. The firmest faith will least distrust any fair and necessary analysis of its claims. True enquiry argues a disposition to believe; true faith, a spirit which does not fear to enquire.

*Isolation and co-operation*, are together another very strongly marked feature of the age. They are to be seen, of course, according to circumstances, in all ages; but seldom could it be said there was a positive *tendency* in each of the apparently opposite directions. The one is traceable in the break-up or disorganisation of parties, political and religious, and even more in the difficulty of constructing new ones. The old lines are confused, and any attempted new lines soon become equally so. Every man has, to use an American phrase, a "platform" of his own, composed of pieces of wreck from divers "platforms" deceased. Hardly any end is to be accomplished without a temporary alliance of persons, otherwise moving apart, if not in hostile lines. The man who loves definition and classification is in despair. The gain to humanity from the unshackling of men's thoughts, and their

resolution not to work in gangs, is manifest, but the disadvantages would at first appear to be equally plain. Even a party is better than what Lord Palmerston called a fortuitous concourse of atoms. It would seem as though personal independence would be purchased at the expense, not only of *esprit de corps*, the strength which comes from sympathy, and some of the necessary conditions of success, but of actual brotherliness and sense of common loss or gain. But, along with this individuality, there is a gravitation towards co-operation, and even unity. Public benefits, formerly left to the chance of individual benevolence, are now accomplished by common consent and common action. The sense of interest which created companies, and the principles which created societies, have found a combined sphere in co-operative movements, and "industrial partnerships." That economic laws cannot be manipulated for philanthropic purposes is indeed a trite dictum enough; but that they cannot be obeyed in such wise as that mutual helpfulness in the doing and mutual well-being from the deed may ensue, is not so clear. The friends of co-operation say that the key of reconciliation of personal and common interests has been found in the principle of making the vendor and the purchaser one. The doubters, that some of the healthier elements of ambition, competition, and successful industry would be lost. The questions involved are too new to permit of many, certainly for such as are ignorant of political economy as a science, forming a competent judgment. To such, it seems that it may begin and end with a—doubtless healthy—infusion of a more brotherly spirit of self-reliance among the working classes; or, that it may be the first vision of an apocalypse, whose successive seals will see a work of judgment on many giant evils, and a more vital unity of the trader and the man.

The circumstances or ideas, however, which have created co-

operation hardly account for the analogous development in the ecclesiastical world. The phenomena of such conjunctions as Mr. Baptist Noel and Mr. Holyoake in one movement, and Lord Shaftesbury and Archbishop Manning in another, are certainly remarkable, if only as showing how wide the interests such questions must embrace, which, with outstretched arms, can touch poles so distant. But these are forms of co-operation; and as *this* is something more than combination, of which it is taking the place, so is that *Unity*, towards which the religious world is yearning, something deeper and truer still. That Christendom was once one, that there is no sufficient reason why it should not now be one, that men should labour for its resolution into one—the breadth and tenacity of the idea are not to be mistaken. All that is written or said against this or that embodiment of the feeling, against even its feasibility or expediency, all criticism, however contemptuous, prove, at all events, that it *exists*: and it is this on which we now insist. The minds of men, either by way of hope or fear, have become filled with it, in disproportion to the character of a speculation. We have only to remember how short a time since the accepted doctrine was, that it was every way better that Christendom should be fifty than one, to realise the change which has brought so many even to wish the fifty were reduced to ten. The press, for a few years past, teems with opinions and facts, small and great, upon the subject. There is only one other sentiment which approaches in strength the resolution to do battle against all comers, and that is the desire to make an ally of the foe. The sentiment has not remained inactive. Amongst some of the more important non-episcopal bodies, negotiations for the union of two, or more, into one, have been going on, and are in some cases practically closed. In the Church of England, three influential combinations are working to what is virtually a like end;

and the fact that the boldest of them — that which contemplates the corporate re-union of the three great branches of ancient Christendom — has some ten thousand members, clergy and laity, of whom hundreds are members of the Greek and Roman communions, is one which, whether practical or unpractical, is undoubtedly significant and suggestive.

Taken in all its bearings, for the last mentioned is in a degree sectional, no phenomenon at all analogous to the present movement towards unity has been visible since a period long preceding the great schism of the tenth century. Before and after that, the characteristic struggle was for supremacy; that of the middle ages, for consolidation; that of the later centuries, for independence. Then the question became, how to make isolation more complete. In the England of the seventeenth, the creeds fought for power, not more perhaps from the love of power, than from the sense that it was the only alternative of bondage. Above the din, sweet voices of peace-makers were indeed heard, but that which Howe pleaded for was union among protestants, Jeremy Taylor, toleration. That there should have been more peace under Anne and the first Georges was little. The church and the nonconformists had recently fought and conquered together; and in the theology of Tillotson and Blair there was little to peril the alliance. Polemics revived, and Irene abdicated. And now, when all systems are alive, and most of them aggressive, each tenacious of its rights and mindful of its wrongs, opinions conceived with freedom and expressed with frankness, and the natural issue would seem to be infinite independence, men dream and talk of that for which peace is too feeble a word. They speak, not of conquest, submission, compromise, truce, not even peace,—Unity. The phenomenon is worthy of more attention, that is a different kind of attention, than it has received.

Independence of thought and deed is a conspicuous and healthful symptom of the times. That vague personality we call "the world," is feared perhaps as much as ever, and perhaps always will be feared more or less. It is only the diseased form of that respect for "public opinion," the collective verdict, which has its influence amongst the data of a modest thinker. But the shackles of "the world" in its concrete form, embodied in any number of individuals variously related to us, have become intolerable. The dedications of old books are the visible links of chains which we marvel greatly that good and able men could have worn. We do not honour Lord and Lady B. less, that we do not soil our pages with greasy eulogy, but more; we prize freedom too highly to think it righteous towards any to imply that they think meanly of it. He who recognises no debt to the judgment of others in the formation of his own is an ingrate; he who will not make use of it, a fool; he who sells or surrenders his own, avowing in the act that it is worthless, a deceiver or a slave.

Side by side with this is the very remarkable development of sacerdotal ideas, and the recognition of at all events certain forms of sacerdotal power. I am speaking apart altogether from the merits or demerits of the questions involved. The future historian will remark that the incidence, so to speak, of sacerdotal ideas, if wider, was not sharper in the Plantagenet era than the Victorian. That the same age which witnessed the practical application of electricity and steam, organised international exhibitions and laid the Atlantic cable, witnessed a bold assertion of claims only less remarkable than the alacrity with which they were recognised; that this was not the work only of those by or for whom the claims were made; that laymen, first in colleges and inns of court, then in shops and ships and exchanges, defiantly affirmed and fiercely maintained them; that the most

adventurous pioneers, and the most resolute champions, makers of the strongest speeches, and writers of the most successful journals, were laymen,—laymen too of all sorts and conditions, not excepting those classes from which the sturdiest opponents of such claims had been wont to come,—classes the most restless in liberty, and the most impatient of control. Malibran is said on one occasion to have exacted from an unsuccessful manager the last farthing of her due, that it might, as a gift, be more worthy his acceptance. The citizen of the nineteenth century stands rigidly on his rights, that he may lay them at the feet of the priest; he would enact Hampden, if thereby he could serve Laud.

It is not the least noteworthy feature of what we may call, for present convenience, the sacerdotal husbandry, that it finds, rather than makes, or finds quite as much as it makes, a prepared soil. It may land at any point of the coast, eagle in hand, sure of voices to cry "Vive l'Empereur." Where it has never yet set foot to do an "educating" work, the lay mind is prepared to welcome it, and meanwhile to amuse itself by working up most unpromising materials into a semblance of it. And when you go from the Church to the religious world beyond its borders, you have not left the whole thing behind you. You cannot of course speak of sacerdotalism in connection with communities built on its repudiation; but the revived ideas, the most vigorous ideas, the ascendant ideas, are those which, at whatever distance, are still nearest to the confines of the sacerdotal. I speak now of the older and more recognised communities. In the case of the newer and more peculiar, it will be found that the most aggressive and successful are those in which the sacerdotal idea is most present.

I do not venture to suggest a solution. The question of the theological truth or otherwise of the sacerdotal principle, is beyond our province as a Society. But as one of the

phenomena of the age, as a fact which should have its place in any comprehensive conception or portraiture of it, it cannot be left out of sight. The simple assertion of the principle would be an anachronism; the ignoring of it no less a mistake.

This is perhaps the most suitable point at which we may leave some seemingly *opposed* phenomena, for some simply *parallel* developments, which, without being opposed, are remarkable for their coincidence, and important, either for contributing in their consideration to the disentanglement of our views, or suggesting problems which need to be solved.

Of the former class are the two parallel developments of æstheticism, and what is loosely known as "Ritualism." By a confusion of ideas, which in the interest of any religious notions is to be deplored, the one is popularly identified, for good or evil, with the other. The fact is that Ritualism is only incidentally an æsthetic movement. Sacred art owes whatever strength or weakness it derives from the association to historic coincidence. Certain dogmas have long been taught, certain observances are their natural expression; that is one fact. But it is wholly independent of the contemporary fact, that society has tired of Georgian rules of taste. The grace and warmth which have visited with so genial an effect our halls and our homes, have visited our temples. In no nation could its religious observances fail, sooner or later, to feel the influences of a general revival of taste. The theology, of which what is called "Ritualism" is supposed to be the expression, simply shares the boon. A beautiful church, without certain adjuncts, would not satisfy the canons of Ritualism; an ugly church, with those adjuncts, would. Æsthetics say it is an open question, whether ornaments of a certain shape and colour are in good taste or not, whether lights are beautiful or not, and the like; that



it depends on the place, the surroundings, and the like. The theology says it must be *there*. Æsthetics say, whatever colour this or that may be, let it be shapely and beautiful. "Ritualism" says, "beautiful or otherwise, it must be green." Let the "Ritualists" and their opponents fight out their battle fairly. But whatever their sympathies in the strife, men of sense, and friends of art, should remember they have a third interest at heart. The banner of the beautiful has no business in the fray. Fairness and ugliness must not stand or fall by the issue. Architecture, painting, music, and their attendant sisters, are handmaids of religion, not slaves of systems. The notion of finality in sacred art is one which cannot for a moment be entertained.

There is one respect in which thought suffers from contact with the general characteristics of the age. The rapidity with which we are accustomed to move, the promptitude with which we are accustomed to act, render us impatient of those slow processes by which the more permanent and reliable results of thought are worked out. Not that rapid thinking is necessarily inaccurate thinking. I should toil and plough slowly through a calculation, at the results of which many who hear me would arrive in time to meet me half way on return. Nor are the influences of the age altogether without a legitimate effect: we have, undoubtedly, more *materiel* than in previous ages, more means and appliances, more rolling stock, less to "evolve out of our own consciousness." Primary truths, quarried for us by God-like labours long ago, and growing ever since in shapeliness and strength, are our heritage, rather than our handywork; and data in rich multitude are at hand. If we have less to quarry, let us remember we have more to build.

Nevertheless, to the average mind and to the many, this power-loom characteristic of modern thought is pregnant with danger. However rapid a process may be, it is a

process. If we could steam to London at a hundred miles an hour, we must give two hours to the task. We cannot execute evils by drum-head court martial, or enthrone good in the hearts of men, or the laws of nations, by the stroke of a pen. Opinions have been getting into the limbo of fashion, and are in danger of coming in and going out with chignons. It has been observed — I think by Conybeare, in his article on Church Parties — that it is the tendency of religious enthusiasm to degenerate in the second generation; if that is true generally, it is perhaps more so now than ever; and if true in religion, it is true in philosophy, in ethics, certainly in art. In vain we appeal from Philip drunk to Philip sober; when he sits to hear the appeal he is drunk again. Mr. Ruskin warns us not to believe what he used to say, and is young enough to write more errata yet. Uncle Tom was the rage, society touched its hat to him; society now, through its eyeglass, gives him a well-bred stare. Copy nature, we say to the artist, and he tries. Slave of fact, we exclaim, you should idealise, and he tries. And then we tell him, with much pomp of words, that he was right the first time, and that fact is the greatest idea. The grey among us were born, architecturally speaking, into a Palladian world; they opened their eyes on Ionic churches, Doric lodges, and Tuscan pumps. Those who followed were only just in time to mourn their decease. We steered due north, ran under crowded canvas through all the Gothic seas, find ourselves already in conflicting currents, and may yet live to drop anchor in Vitruvian harbours, and grow garrulous against the spires and finials of our youth.

One evil amongst others incident to this fungous growth of opinion is, that people who think slowly, or slightly, unwilling to seem ill-informed or out of date, dispense with the intermediate formulæ, and rush, rather than arrive, at conclusions; or, to save all trouble, buy them wherever

"neat things in opinions" are to be had. So they will always do. The moral, of course, is that those who do think, and who, by aspiration or by circumstance, are "leaders of opinion," should know whither, as well as whom, they are leading.

The peculiar form which Town life is more and more assuming is one of the most remarkable characteristics of the age. We are becoming an urban nation. Our employments and interests draw us more and more into masses. The picture of a kingdom of towns, varied only by parks, hills, or commons, is indeed one as unnecessary as it is painful to contemplate. Our literature must have been burned, our most truly national pictures defaced, our music silenced, and our character despoiled of some of its best elements, before we could bear to see such an England. Brook and copse, lane and meadow, farm and spire, are words we dare not let die. But the area they adorn is becoming less, and the denizens fewer. More of the poor live in towns, and more of rich *and* poor work in them. But parallel with this fact is the other, that the rich as a body will work *only* there. The town of old time was a microcosm. The king—if it was a capital—was much there. Nobles dotted the banks of the river with their palaces, and were familiar in the streets. Retainers and apprentices fraternised, courtiers and merchants, lawyers and divines, philosophers and scholars met in Paule's or Chepe, chambers or coffee-houses, worshipped on Sunday in the same church, slept on week-days within sound of the same bells. The symposia are no more. Goldsmith would ring for Bradshaw, and Reynolds stalk off loftily to catch the 9.30. The scattered group would dot themselves down in sloppy townlets, each unit the sun of a system of sparks and glow-worms, enjoying the advantages neither of town nor country. And since, as facilities multiply without, and rents increase within, the tendency to emigrate

will become enlarged, the field of speculation becomes wide and tempting. If a large town is to become a mere nucleus of marts and stores, with a dense border of those who can get no farther, and an irregular fringe of those who can, either the march of town improvement must be stayed, or the impressive and refined influences of great human works, which to the citizen make up for the absence of nature, will be the monopoly of the humble, and we shall have to found schools of science and art for the improvement of those above them. For the greater architectural works, and whatsoever they imply, must still be in the town; churches, museums, theatres, exchanges, halls, "*artibus, legibus, consiliis.*" But the problem grows in exigency—and whoso contributes to its solution is a true philanthropist—how may the new relations of classes thus created be best adjusted, that evil may be prevented and good accrue. The breaches of intercourse made by the conditions of modern commerce and manufactures are being widened by isolated homes; and although the humbler may find means to follow the richer, these again will flee farther still. "Out of sight, out of mind." The warehouse and noonday are not the place or the time for fraternity. Democracy itself is more accessible to Carlylean influences. The morning and evening nod, the friendly inquiry, the frank and mutually respectful interchange of ideas, the delicacy which teaches delicacy, the co-operation of the good and strong of all ranks for the benefit of the bad or weak, are theirs who meet "out of business hours," whose garden walls are not too far apart, who know the same doctors and parsons, whose voices mingle in the same churches, whose graves, alike in neighbourhood and difference, are the silent echoes of their homes. How would all this be supplied? The tendency to think less where the contact is less, or where it is under less sympathetic conditions, is one it is vain simply to deprecate or

condemn. It is natural and inevitable; we must see and hear, touch and feel, in some way, if we are to *do*. Nor is it to be supposed that any degree of amelioration and elevation of the humbler classes, which can for long be rationally looked for, will of itself be a remedy; for not only is it inconceivable that the elevation should be accomplished, if those who must at all events aid, are isolated; but as, under any circumstances, there will always be ranks and classes, so there will be always ends to serve by contact of great importance to humanity. If it is too much to hope that with the amelioration of the condition of the working classes, with the growth of temperance, providence, and education, may come a time when they shall not be thought undesirable neighbours, and when "cottage property" may not make "eligible villas" less so, we must look to other points of contact. If the relation of neighbourhood is impracticable, what other relations remain? That of givers and receivers of alms applies but within certain limits, and the narrower of course the better. That of visiting and visited, useful as in wise hands it is, must be expected to grow more limited in area as the homes multiply in which only the minister of religion could be an unbidden guest. And as the denizens of these should in their turn be ministrants of deeds of kindness to the less fortunate, the need of sound bonds between them and the more favoured still would be the greater. The fact is, that the relation of patron and patronised, in some form or other, inevitable as it has been, and still is, is incompatible with the more brotherly relations we seek to establish, and which the altered conditions of town life may assist to prejudice. Once make it possible for gentleman and artizan to meet without an uneasy sense of there being something to get or something to guard, and though the thing will still remain to be done, a cardinal difficulty in the way of the doing will be removed. Then, or in view of

it, it may may be considered whether common ground and common occasions may not be found. Our libraries and museums, our galleries and schools of art, seem to afford the means and the occasion in many ways if we are willing to address ourselves to the task. More frequent and more friendly intercourse is what we want. Already tentative things have been done. The meetings in connection with the Church Congresses, and that in London on the subject of the working classes and religious institutions, have been, very faint indeed, but perhaps real, shadows of things coming. Such movements as the United Kingdom Alliance, setting aside our opinions of the policy advocated, are valuable, for accustoming people widely separated in society to act together. And perhaps one of the best gatherings of this kind has been the recent Conference on Co-operation in Manchester, both because of its composition, and because of its topic. To keep all ground common that is already properly so— as for instance church ground ; to enlarge such as admits of enlargement, and to devise new ways of common intercourse, and new paths of common action in view of new conditions ; these seem to be in brief the tasks of the time which the isolating influence of town changes suggest to us.

The isolation of classes is not the only effect of modern town conditions. Those whose tastes and objects are already common, meet and act only with increasing difficulty. Voices we should be glad frequently to hear, grown hoarse with busy care by day, are lost among suburban echoes at night. As the radius enlarges, and the scattering grows, the centre is more and more distant. If we are to come to a circumference of city-villages, each with its small life and its coteries, let us hope the time is distant. The centripetal force has not yet lost its potency. In the converse of congenial minds, the contemplation of ennobling objects, the discourse of profound or graceful

themes, those who will may yet find both luxury and strength; in united conflict with things evil, learn skill to meet them alone; in the independent yet modest exercise of thought, nourish that desire to learn which best qualifies to teach; in the diligent use of social conditions as they are, prepare to meet well and wisely any new conditions which may arise.

“As iron sharpeneth iron, so a man the countenance of his friend.” Thus may we aid the race as it is, and assist to forge

“ a closer link  
 Betwixt us and the crowning race  
 Of those that, eye to eye, shall look  
     On knowledge; under whose command  
     Is Earth and Earth's, and in their hand  
 Is Nature, like an open book.”

## FIFTH ORDINARY MEETING.

ROYAL INSTITUTION, 16th December, 1867.

The Rev. C. D. GINSBURG, LL.D., PRESIDENT,  
in the Chair.

The Rev. Andrew Wilson, B.A., was unanimously elected an Ordinary Member.

Mr. Moore exhibited a portion of the collection of natural history specimens from the Island of Madagascar, collected there, and bequeathed to the Derby Museum, by Mr. William Tyrer Gerrard, who was born at Knowsley, and died, aged 35, at Foullpoint, Madagascar, in July, 1866, from yellow fever.

The Rev. J. Holding, F.R.G.S., (several years resident missionary at Madagascar, and introduced to the meeting by Mr. Moore,) then read a lengthened notice of Mr. Gerrard's efforts in the cause of natural history, from the time of his arrival in the Island to his death and burial at Foullpoint, giving many graphic details of the difficulties Mr. Gerrard had to contend with, and of his ardent zeal in the service of science.

The Paper by Mr. John Newton, M.R.C.S., "On Fire as an Agent of Civilisation, and the various modes of obtaining it," which was read at this meeting, will be given in a subsequent part of the Volume, unavoidable circumstances necessitating this arrangement.



## SIXTH ORDINARY MEETING.

ROYAL INSTITUTION, 13th January, 1868.

J. BIRKBECK NEVINS, M.D., VICE-PRESIDENT,  
in the Chair.

The Rev. W. A. Whitworth, B.A., and Mr. C. H. Stearn, were unanimously elected Ordinary Members.

The Hon. Secretary read a letter from Dr. Baker Edwards, of Montreal, late one of the Vice-Presidents of the Society, in acknowledgment of the address presented to him by the Society, and expressing his hearty thanks for their expression of good will, which he valued most highly and very cordially reciprocated.

Mr. Moore then exhibited a living specimen of the *Proteus anguinus*, which he said was an object of very considerable interest. They were indebted for it to Mr. John Dove, who was then present, and who brought it himself from the celebrated grotto of Adelsberg, in Carinthia, on the road from Vienna to Trieste. Although these creatures had been long known, they were rarely seen; they resembled an eel with legs, so much were their bodies elongated. They were quite blind; at any rate the eyes were extremely small, and covered by the skin, through which they were with difficulty discerned as round black spots. The powers of the sight must therefore be very small, if they existed at all.

A singular circumstance was that although this specimen had only been exposed to the ordinary light of the room, the

black spots indicating the position of the eye had become more visible than when Mr. Dove first obtained it; it was a subterranean specimen, and the skin was of a white or flesh colour. Mr. Dove stated the animal was more lively by night than by day.

Mr. Moore then showed two little creatures which Mr. Dove obtained from the same cave. They looked very like ants, but were supposed to be beetles. He thought they were greatly indebted to Mr. Dove for his kindness in bringing these specimens for their inspection.

Mr. Moore next exhibited a group of fossils (Andrias, Schenchzen, Tscudi), of the order of the miocene tertiary, from Oeningen, Switzerland, the original of which is to be found in the British Museum. About a century since it was thought that this fossil was a human skeleton, but Cuvier had proved that it was an amphibious reptile, belonging to the group already mentioned.

The following Paper was then read:—

## ON SOCIAL LIFE AMONG THE TEUTONIC RACES IN EARLY TIMES.

By J. A. PICTON, F.S.A.

THE civilised life of modern times presents so complicated an aspect, its springs of action are so manifold, its relations so multifarious, that the analytical inquiry into its primitive elements is an exceedingly difficult task.

And yet if we would rightly comprehend the political and social phenomena of the present time; if we would understand the distinctive features of the various nations of modern Europe, it is necessary that we should investigate, in a general way at least, the condition of the original stocks out of which these goodly branches have grown. The spring at the fountain-head gives the character to the river which flows from it; and the physical and mental condition of our early ancestors has imparted its bias and tone to every period of our history.

On the present occasion, I propose to institute an inquiry, necessarily brief and slight, into the early social condition of the Teutonic race. This is the stock to which we as Englishmen belong, and from which we derive most, both of our good and evil qualities. The sources from which I have principally drawn my illustrations are the early laws of the three principal Teutonic tribes, the Franks, the Alemanni, and the Anglo-Saxons.

The laws of a people are an unerring test of their condition; of their government, personal relations, their prevalent vices and virtues, their manners, customs, property

and mode of life. Every law shews us by implication the state of things requiring it, and thus pictures in strong colours the general state of society existing at the time of its enactment.

Our earliest notices of the German races are derived from Cæsar, but the fullest account handed down from classical times is found in the *Germania* of Tacitus. The picture there presented is that of a people just advanced into what is called by ethnologists the iron age,\* divided into numerous tribes with no regular government; electing their kings or chiefs as necessity required, but usually from particular families.† The law was administered in assemblies of the whole people, called by Tacitus *Concilia*, equivalent to the *folc-mot* of our Saxon ancestors, or the *Thing* of our more Northern relatives.‡ Ignorant of letters as they are said to have been,§ their laws and customs must, at this period, have been handed down by tradition only.

About the year A. D. 360, letters were introduced amongst the Goths of Mœsia, and the Scriptures translated into their language by their bishop, Ulphilas. They had also a collection of written laws, which have unfortunately been lost.

Our business at present is with the Western branches of the great Teutonic stock. The multitude of separate clans named by Cæsar and Tacitus gradually crystallised into tribes, and these again formed themselves into confederacies, which ultimately became nations. The three great western Confederacies, or nations, were the Franks, the Alemanni, and the Anglo-Saxons.

\* *Ne ferrum quidem superest sicut ex genere telorum colligitur.*—Tac., *Ger.* sec. 6.

+ *Reges ex nobilitate, duces ex virtute sumunt.*—Tac., sec. 7.

† *De minoribus rebus principes consultant; de majoribus omnes.*—Tac., sec. 11.

§ *Literarum secreta viri pariter ac femina ignorant.*—Tac. sec. 19.

The Franks are first heard of A. D. 240, when Aurelian, afterwards Emperor, encountered an invading force, and drove them back across the Rhine. Many derivations have been suggested for the name, but the most probable is that supported by the high authority of Gibbon and Grimm, that it implied a Confederacy or nation of free men. The Franks were separated into two divisions, the Ripuarians who inhabited the neighbourhood of the Rhine, and the Salian or Salic Franks, whose original seat was on the river Saal.

There is a mythical account of a king Pharamond, who is said to have flourished in the fifth century; to have established the monarchy, and to have collected the Salic laws. The story, however, rests on no solid foundation.

There can be no doubt that the laws of the Franks are the earliest illustrations of the condition of the German races, and in their original condition are of very high antiquity. They bear internal evidence of having been originally prepared before the existence of a kingly government over the whole nation.

They were revised by king Clotaire A. D. 598, and enlarged and extended by Charlemagne A. D. 768–814. The existing text is in Latin of a barbarous dialect. There are several versions, some of them interspersed with old Frankish words, the import of which it is extremely difficult to determine. Two versions are given in Schilter's *Thesaurus Antiquitatum Teutonicarum*.\*

The Alemanni were a collection of tribes principally seated in the ancient Rhætia, between the sources of the Rhine and Danube. The name is supposed to be derived from the extent of the confederation, meaning "all men" in the old German, *alle männer*. They are first noticed

\* *Ulmæ, Danielis Bartholomæi, 1727 A. D., 8 vols. fol.*

in the reign of the Emperor Caracalla, A. D. 214; after various vicissitudes we find them, A. D. 496, beaten by the Franks under Clovis in a great battle. In the sixth century they united with the Suevi and formed the Duchy of Allemania. They occupied so important a position in the eyes of their western neighbours as to have given the name by which Germany is known to the French at this day, "Allemagne." Their laws, as handed down to us, were finally revised by Charlemagne in the eighth century.

They exhibit a great change from the simplicity of the Salic code, embracing a greater variety of topics, and proceeding on different principles. They manifest the greater supremacy of law, and greater power of punishment. The Church had become mixed up in all the affairs of life, and weaves its tissue of influence through all the ramifications. A considerable part is also derived from the Roman civil law.

The *Jus Provinciale Alemannicum*, is also found in Schilter's collections. The laws are written in the Theotisc, or old high German dialect, with a Latin paraphrase, which in many cases differs materially from the old German text.

The early history of the Anglo-Saxon race in England, is too well known to require any summary here. We have a very full collection of the laws of the various Saxon kingdoms from the earliest times. My illustrations are drawn from the laws of Ethelbert, king of Kent, baptised in 597, died in 616; those of Ine, king of the West-Saxons, 688-725; Alfred, 871-901; Edward the elder, 901-924, Athelstan, 924-940, with others.\*

With these preliminary observations, let us now endeavour to ascertain what light is thrown on the social condition

\* These will all be found in the 1st volume of the *Ancient Laws and Institutes of England*, issued by the Record Commission, 1840, edited by Mr. B. Thorpe.

of our early ancestors and congeners, by these various collections of laws.

First, let us inquire into the personal condition of individuals in their relation to each other. However far back we search into the history of the Teutonic races, we find at least three orders recognised, the noble, the freeman and the slave. In Tacitus we find indeed four ranks; *nobiles*, *ingenui*, *libertini* and *servi*.\* It has been held that originally there were only two orders. "*Olim quicumque Liber nascebatur, nobilitatis etiam particeps quodammodo censebatur. Potentia et opes erant illae revera, quae unum supra alterum efferebant.*"† Captives taken in war became the first slaves, and from these simple relations arose the various subsequent complications of rank.

Amongst the Alemanni there were three classes of free men, who are thus described :—

"Hie sol man hoeren von drier hande frien luten, waz rehtz die haben.

Ez haizzent ains *semper-frien*; daz sint fri herren die ander frien ze manne haben.

Daz ander sint *mitler frien*, daz sint die, die der hohen frien man sint.

Daz dritte sint geburen, die fri sint, die haizzent *fri lantsœzzen*.

Der hat jeglicher sunder reht, alz wir hernach ju wol gesagen."

"We shall here speak of three sorts of free people; what rights they possess.

The first are called "entirely free;" these are they who have other freemen as vassals.

The second are styled middle free; these are the vassals of the first.

\* Tacitus, *Germania*, secs. 24, 25.

† Muratori, *Antiq. Ital.*, vol. i. 714.

The third are the peasants who are free; these are called free land-tenants.

Each of these classes has its separate rights, as we shall hereafter shew you."

Originally amongst the Saxons the same division prevailed. "Gens Saxonum omnis in tribus ordinibus divisa consistit. Sunt enim inter illos *Edelengi*; sunt qui *Frilingi*; sunt qui *Lassi* illorum lingua dicuntur. Latina vero lingua hoc sunt Nobiles, Ingenui et Serviles."\*

In the course of time other and more complicated relations grew up. The nobles, who were only distinguished from the Frilings by wealth, when poor, dropped into the rank below, and the free men (*ingenui* or *liberi*), became in many cases dependent, and swearing fealty to a superior (*patronem sive seniozem*), became vassals. These are called in old charters *arimanni*, or *herrmanns*, equivalent to "Ingenui, qui rusticum prædium excolebant, aut Beneficia à principe receperant;" in fact they were tenant farmers. Muratori gives examples of deeds amongst the Lombards, in the north of Italy, in the eighth and ninth centuries, which for detail and stringency in the covenants might stand as models for modern leases.

In a paper like this, it would be impossible to enter into an explanation of the complex conditions of the society of the period we are now contemplating; amongst the Franks, the *Antrustiones*, the *Leudes*, the *Ingenui*, *Liberti*, *Liti*, *Mancipia*, *Servi*; amongst the Alemanni, the *hohen Dienstmannen*, the *Semper frien*, *Mitler frien*, *Buwelüten*, *Geburen*, &c.; amongst the Saxons, the *Etheling*, the *Thegn*, or *twelf hynde man*, the *six hynde*, *twy hynde man* or *ceorl*, the *radman*, *socman*, the *theow*, or slave, &c. It may be stated generally that our modern idea of the equality of all ranks and classes in the

\* Nithardus, lib. 4.



eye of the law, had no existence. Each rank and class was legislated for separately; their offences were differently punished, and their compensations for injury were awarded on a different scale. A whimsical instance of this is presented in the Salic laws. In the palmy days of Rome, to be a Roman citizen was esteemed the highest honour which an individual could possess. *Civis Romanus sum*, was the proud claim for exemption from bondage and every ignominious punishment. In the sixth century, amongst the Franks, a melancholy change had taken place. To be a Roman was rather a mark of degradation, than a claim to honour. It would appear that, at that period, when a man quarrelled with his neighbour, instead of giving him a punch on the head as the bold Briton of the nineteenth century would do, they had an ugly practice of binding each other with cords.\* Against this habit, chap. 34 of the Salic laws is directed. It is headed, “De eo qui hominem ingenuum sine causa ligaverit.” The fine levied upon a Roman was much more severe than that inflicted on a Frank. “Si Romanus Francum ligaverit sine causa, mille ducentis denariis, qui faciunt solidos triginta, culpabilis judicetur.”

“Si autem Francus Romanum ligaverit sine causa, sexcentis denariis, qui faciunt solidos quindecim, culpabilis judicetur.”

It is curious to note that amongst the Ripuarian Franks this rule was reversed. A Frank insulting a Roman was convicted in a severer penalty than the Roman insulting a Frank.

It is generally considered that there is no more certain test of the true progress of civilisation than the state of the relations between the sexes. Measured by this standard, the Teutonic races have always held a high place.

\* This custom is alluded to by Tacitus, *De Mor. Ger.*, sec. 24.

Even in the time of Tacitus, the marriage relations extorted the praise of the Roman observer. "Quanquam severa illic matrimonia; nec ullam morum partem magis laudaveris: nam propè soli barbarorum singulis uxoribus contenti sunt." After remarking that amongst the Germans the dower was not given by the wife to the husband, but by the husband to the wife, he says that the wife fully understood she was to be the sharer of the good and evil fortune of her spouse. "Ne se mulier extra virtutum cogitationes, extraque bellorum casus putet, ipsis incipientis matrimonii auspiciis admonetur, venire se laborum periculorumque sociam, idem in pace, idem in prælio passuram, ausuramque."

These principles are fully borne out by the enactments in the old laws. In the dooms or laws of King Edmund, A. D. 940, the marriage customs in England are fully set forth. If a man desired to betroth a maiden, he had to promise her friends that "he desires her in such wise that he will keep her according to God's law, as a husband shall his wife; and let his friends guarantee that." He had then to give a pledge or security to this effect. This pledge was called a *wed*, hence our term "wedding" applied to a marriage ceremony. If all was agreed, then the wife was entitled to half the property, or to all if they had children in common, unless she again chose a husband.

On the morning after the marriage it was customary for the husband to present to the wife a *morgengabe*, or morning gift. The indulgence of the newly married men was sometimes carried to such a pitch that it was necessary to enact laws to restrain their liberality. Amongst the Lombards, the *morgengabe* was restricted to one-fourth of the bridegroom's substance. The Alemannic laws permit the gift of a servant and maid, with a certain quantity of land and buildings. The law then proceeds: "Ez git der friherr sinem wibe daz wol hundert mark giltet; ich main fürsten

und ander friherren. Die mitteln frien, daz zehen pfunt gelt. Der fürsten dienstman, daz fiunf mark giltet." "Free-men may give to their wives to the value of a hundred marks, I mean nobles and others entirely free. The middle free, to the value of ten pounds; the vassals of nobles, to the value of five marks." We heard a few years ago, a good deal about *morganatic* marriages. This was a *quasi* marriage, arising from the *morgengabe*. Where no previous ceremony had taken place, the morning gift was held to convey certain rights, though not to the extent of a legal marriage, and was resorted to where crowned heads and princes entered into a connection with a woman of lower rank.

In case of unfaithfulness to the marriage vows a very summary method was adopted. The laws of king Ethelbert enact: "Gif friman with fries mannes wif geligeth his wer-gelde abige; and other wif his agenum sceatte begete, and thœm othrum œt ham gebrenge." "If a freeman debauches a freeman's wife, he must be fined according to his wer-geld, and he must buy another wife with his own money, and take her home to the other man." This is assuredly a very simple and business-like way of assuaging wounded feelings, and assessing damages in a *crim. con.* prosecution.

The marriage of widows was originally not permitted, and was always looked upon with something of disfavour amongst the early German races. In the Salic laws, when a man wished to marry a widow, a court or public assembly had to be called, when certain formalities were gone through, and securities given. A certain sum of money had to be paid by the intending bridegroom to the relatives of the deceased husband; the inheritance of which went first to the sister's son, then to the cousin by the mother's side, and, failing these, to the maternal uncle. Any man marrying a widow without this formality, was liable to a fine of 2,500

denarii, equal to  $62\frac{1}{2}$  solidi, or shillings, which, as the price of an ox was about one shilling, was no trifling penalty.

Females were protected from insult by regulations quite as strict as those of our own time. By the Salic laws, if a man squeezed the hand or finger of a woman he had to pay a fine of 600 deniers, or 15 sols; if he squeezed her arm, the penalty was 1200 deniers, or 30 sols; but if he had the temerity to touch her breast, he was mulcted in 1800 deniers, or 45 sols.

I may here say a word on the general principles embodied in these early laws. "They are such as might be expected from the time and place of their composition. Necessity, it has been well said, dictated them, and freedom wrote them down. They bear the stamp of a rude and free people, living by agriculture and the pasturage of cattle, ignorant of the complicated relations of civilised life, and prone to crimes of violence, rather than of licentiousness or chicanery."\* These remarks apply especially to the laws of the Salian Franks, the earliest code which we possess, and in which there is a striking coincidence with the particulars we learn from Tacitus.

The earliest form of punishment for offences was the *lex talionis*; an eye for an eye, a tooth for a tooth, the infliction on the offender of the evil he had himself committed. There are many remains of this in all the early Teutonic laws. Thus, in the *Jus Aleman.*, ch. 168: "Der dem audern ainen zan uz sleht, dem tu man daz selbe." "Whoso strikes out the tooth of another, to him the same shall be done." So in the laws of king Alfred, No. 18: "Gif hwa othrum his eage othdó, selle his agen fore; toth fore toth, honda with honda, fet fore fet, boerning fore boerning, wund with wund, lœl with lœle." "If any one put

\* Perry, *History of the Franks*, p. 483.

out the eye of another, let his own be given for it; tooth for tooth, hand against hand, foot for foot, burning for burning, wound against wound, stripe against stripe."

As early as the time of Tacitus this rigid system of revenge had somewhat softened down. He says: "*Suscipere tam inimicitias seu patris seu propinqui, quàm amicitias necesse est; nec implacabiles durant. Luitur enim homicidium certo armentorum ac pecorum numero, recipit-que satisfactionem universa domus; utiliter in publicum, quia periculosiores sunt inimicitie juxta libertatem.*" "They (the Germans) are bound to take up the feuds as well as the alliances of their fathers and relatives, but they do not remain implacable; for even homicide is compounded for by a certain payment of cattle and sheep, and the whole family receives satisfaction. This is useful in a public sense, for feuds are very dangerous towards freedom."

In the course of time this commutation of punishment for a money payment became embodied into a system under the head of "*Leodis*," "*were geld*" or "*bot*," which forms the main staple of the Teutonic laws. In the later Anglo-Saxon codes, a regular catalogue is made of the various parts of the human frame, and the price set upon each. Thus, in the laws of Alfred, if a man strikes off another's thumb, he must pay thirty shillings; for the little finger, nine shillings; for the nail thereof, only one shilling. If, however, he soars higher, and desires the luxury of smiting off his neighbour's nose, he must pay sixty shillings; but if he strikes off his shank near the knee, he must pay eighty shillings for the pleasure.

This may seem at first sight incongruous and repulsive, but we shall find much to be said on the other side. The change from brutal revenge to a money compensation was a step in the direction of order and law. It repressed the thirst for blood; it prevented that worst of evils, and most

inimical to peace and safety, the perpetuation of feuds. At that time no other means of punishment existed, except retaliation in kind. Imprisonment was out of the question; jails had no existence, and would not have been submitted to in the habits of rough freedom then prevalent. Indeed, at the present day, with all our boasted progress, we still retain much of the same spirit in an administration of the law. If Lord Tomnoddy or the Hon. Captain Fitz Humbug indulge in a midnight freak, by which the eyes and limbs of Her Majesty's peaceable subjects are endangered and brought to grief, forty shillings and costs usually sets all to rights.

There is a striking difference in this respect amongst the codes of the Teutonic races in early times. Whilst in the Salic laws no other punishment is awarded for any offence but a money compensation, in the Alemannic laws, as revised by the Emperor Charlemagne, money compensation is ignored except as a composition for minor offences.

"Den diep sol man hahen," "The thief must be hung;" is the stern and simple dictum of the law; but if the amount stolen did not exceed the value of five shillings, the thief was let off with a flogging, not exceeding in any case thirty stripes, which might be compounded for by a payment of five shillings in addition to the value of the stolen goods. Homicide, incendiarism, rape and other serious offences were punished with breaking on the wheel or beheading.

In the Anglo-Saxon laws there is a curious mixture of absolute punishment and money compensation, the latter, however, having the preponderance. In the laws of King Alfred, a considerable portion of the Levitical code of punishment is incorporated into the earlier portion; *e. g.*, "The man who slayeth another wilfully, let him be put to death." Yet in a subsequent law, in the same code, we read, "If any one with a *hloth* (a company of robbers) slay an unoffending *twy-hynde* man, let him pay *wēr* and *wite* (that is, a compen-

sation to the family and a fine to the king), and let every one who was of the party pay thirty shillings as "*hloth-bot*."

Amongst the Franks and Saxons, every man literally had his price. By the Salic law the *leodis* or life value of an *ingenuus*, or free man, was two hundred *solidi*, or eight thousand *denarii*, that of a tributary Roman, forty-five *solidi*, or eighteen hundred *denarii*. Amongst the Anglo-Saxons, men were divided into classes, according to the amount of wër-geld, or money compensation, attaching to the life of each. Thus the twy-hynde, or "two hundred" man, the ordinary free man, had his life valued at two hundred shillings; a six hynde man, at six hundred; and a nobleman, or twelve-hynde man, at twelve hundred shillings.

The administration of the laws, and the system of government generally, was in its origin essentially popular.

Tacitus says, "*De minoribus rebus principes consultant, de majoribus omnes; ita tamen ut ea quoque, quorum penes plebem arbitrium est, apud principes pertractentur.*" "*Elinguntur in iisdem conciliis et principes, qui jura per pagos vicosque reddunt.*"\* This was their condition about the first century of our era. When we next get a glimpse of their condition from the Salic law, about the end of the fifth, or beginning of the sixth century, we find the same principles still prevalent. The principal court was called the *Mallus*, which was held in the open air at stated periods for the administration of justice. The shield and spear were the emblems of authority, where every free man had a right to be present fully armed.† Amongst the Alemanni this primary assembly was called the *Vogt-dink*, or people's council; amongst the Anglo-Saxons, the *Gemót*. These assemblies were held at

\* Tac., *De Mor. Ger.*, ch. 11 and 12.

† *Nihil autem neque publicæ neque privatæ rei, nisi armati agunt.*—Tac., *Ger.* o. 18.

stated periods. Edward the elder enacts, "Ic wille that ðeð gerefa hœbbe gemót á ymbe feores wucan, and gedon that ðeð man sy folc-rihtes wyrthe." "I will that every sheriff hold a 'gemót' once in four weeks, and order that every man be worthy of folk-right."

For the purposes of convenience and mutual assistance, very early amongst the Anglo-Saxons, the community was divided into tithings of ten families, and hundreds of a hundred families. Traces of the hundred may be found as early as the time of Tacitus. In the north of England the "hundred," probably owing to Danish influence, merged into the wapentake, or weapon touch, so called from the armed attendance at the court, whether Saxon *Gemót* or Danish *Thing*.\*

Judges were appointed, at first by popular election, but afterwards by the king. These judges were authorised to take the advice and assistance of those around; a practice which ultimately led to the important result of trial by jury. Thus in the Alemannic laws, ch. 164: "Ez ist etwa gewonhait, daz man zwelf man nimpt, diē dem Rihter sulen helfen rihten; die haizzent schepfen." "It is in some places usual to take twelve men, who shall assist the judge to decide; these are called 'schepfen.'" They were, however, only considered as aids. "Swa schepfen sint, die man ze geziugen han uber alliu dink, dur in der stat geschehent." "Where there are jury-men, let them testify (or advise) on every thing which occurs in the place."† In the Salic laws, Tit. 61, "De chrenechruda," it is enacted that, if one man slay another, and his whole possessions are not sufficient to satisfy the law, he must procure twelve men to swear that

\* — *quasi concussio armorum. Germani enim veteres nec concilium inibant, nec iudicia exercabant, nisi armati. Quæ displicuit sententia, fremitu aspernare; quæ placuit concussis frameis laudare solebant.*—Spelman, *sub voc.*

† *Leg. Aleman., c. 184.*



he has not, either upon the earth or under the earth, any other property than what he has given up. After some further symbolical ceremonies, he was then to go free.

Sooth to say, however, in these early times there were many ways of escaping or of wresting justice. In certain cases, such as accusations of homicide, violent robbery, treason, &c., the accused had the right of an appeal to the wager of battle; and elaborate precepts are set forth in the law, for the order and arrangements of the duel. Those whose courage was not equal to this forcible mode of defence had the option of resorting to the trial by ordeal, which is thus described in the Alemannic laws: "Man sol im dri wal fur tailen, die wazzer urtail oder in ainen kessel vol wallendez wasserz untz an den elentogen grifen, oder dax haizz ysen uf der hant ze tragen, Geriht er damit, so ist der urtail ledig." "For the sentence there shall be three choices: the water ordeal; the putting the arm up to the elbow in a vessel of boiling water; or carrying a hot iron in the hand; if he clears himself by either of these methods he shall go free."

The cold water ordeal here alluded to consisted in casting the accused into a deep pool or stream. If he floated he was adjudged guilty; if he sank, and was probably drowned, he was acquitted. The whole system of ordeal was calculated to evade justice; since it is difficult to see how, without collusion, any person exposed to it could possibly escape.

But when all these methods failed to exonerate the accused, there was still left the method, so rife in the olden times, of bribing the judge. It is not often that purchasing justice is found sanctioned in a code of laws, but in the Alemannic code it is actually embodied in a chapter entitled, "How justice may be bought."

The naivety of the passage is worth quoting: "Und mag ain man sin reht anderz niht behaben, er gebe dem Rehter

gut, und andern die darzu gehœrent, und die hievor genennet sint. Wir raten im e daz er sin Reht verliese, daz er sin gut e gebe. Ez ist bezzer ain wenig ze geben, denn ain michel tail verlorn."

"If a man cannot otherwise get his rights, unless he gives money to the judge and to the others who belong to him, whom we have before indicated, we advise him, rather than lose his cause, that he shall first give his money. It is better to give a little than lose a great deal."

From what has been already stated, it will be seen that the prevalent offences were violence and rapine. Men had not forgotten the period antecedent to all law, when every man claimed the right to avenge himself. Indeed, this right is expressly acknowledged in the laws of King Alfred, No. 42, Tit. "Be Feathum," where a man is forbidden to fight before he has demanded justice, but failing to obtain this he is at liberty to besiege his enemy.

It would be easy to draw a fearful picture of a state of society in which a man might slay his neighbour and burn the body, and compound for his offence by the payment of a fine of 500 shillings;\* where it was lawful, for any or no cause, to murder the servant of his neighbour, on merely paying his price in the market;† where a man had a legal right to sell his own children for slaves;‡ when open warfare by one private individual against another was authorised as above; but this would be a very partial and unfair judgment of the times of which we are treating.

It must be remembered that the evidence of the laws shews only the worst side of human character, and is at best only negative. The laws of the present day, from the crimes

\* See *Leg. Salic*, tit. 74, *De chreodiba*.

† See *Leg. Salic*, tit. 37, *De homicidiis servorum*.

‡ "Verkauffet ain man sin kint durch chaft not, daz tut er wol mit reht." "If a man sells his children for a sufficient reason, he has a right so to do."—*Jur. Aleman.*, c. 347, *Der sin kint verkauffet*.

which are specified and made punishable, might lead to an inference very unfavourable to modern civilisation. The laws themselves can give no indication of the extent to which particular offences may be prevalent, and the statutes may remain, long after the offence denounced has disappeared from society. We must not forget that it is out of these institutions that German and English progress have been developed; that the customs and manners of which we are treating have aided in stamping on the Teutonic character that union of individual self-reliance and capability of combination, that self-denial, perseverance and energy which have enabled them to pioneer the world.

In the statutes themselves, we have many indications of a spirit of even-handed justice and love of right. In the laws of Ethelred we find this passage; "and always, as one shall be more powerful in the eyes of the world or higher in degree, so shall he the more deeply make bot for sins and pay for every misdeed the more dearly, because the strong and the weak are not alike, and cannot raise a like burthen; moderation is therefore to be used, and discreetly are to be distinguished both in divine shrifts and in secular corrections, age and youth, rich and poor, hale and unhale, and every order. And if it be that any one unwillingly or unintentionally do anything amiss, he shall not be like to him who misdoes intentionally and of his own will. "Let every deed be carefully distinguished and doom ever be guided justly."

In another part of the same laws, we read exhortations "to comfort and aid God's poor; that they should not oppress widows and step-children, but willingly gladden them; that they do not vex or provoke foreigners or comers from afar; that they do not command injustice to other men; but that every man enjoin to others that justice which he desires shall

be enjoined to him according as it is reasonable; and that is very just law.\*

Concerning the everyday life of the early Franks we have not much record; Gregory of Tours is almost the sole authority. In his history of the Merovingian period, there is much which is intensely interesting. The story of St. Fredegonda, Queen of King Clothaire, with her education, intellect and refinement, at the barbarous period of the sixth century, constitutes a romance which will well pay perusal.

Of the domestic life of our Anglo-Saxon ancestors, we have much more ample details. In the eighth century they had attained considerable cultivation, though still simple in their manners. The legend of the poet Cœdmon, narrated by Bede, gives a peep into the interior life of the period. Cœdmon was a poor cowherd, who had lived to middle life without any education or training. At the entertainments of that time, it was customary for the harp to be passed round from hand to hand, each person in turn reciting or singing a song, with the accompaniment of the instrument. Poor Cœdmon, as the instrument gradually approached him, feeling his ignorance and incapacity, arose for very shame, and hied home to his house. This he had done several times, till, on one occasion, after going to the shippon and attending to his beasts, he threw himself down in despair and fell into a sleep. In this state a vision appeared to him. He heard a voice calling him by name, saying "Cœdmon, sing me something." To which he replied, "I cannot sing, and never could: even now I have been obliged to quit the company because of my inability." The voice rejoined, "Nevertheless thou mightest try to sing for me." He replied, "What shall I sing?" The voice said, "Sing about the creation." "Then," adds

\* *Laws of Ethelred*, 6 sec., 46, &c.

the legend, "he burst into song, with words which he had never heard," being the poem on the creation, well known to Saxon scholars, to which some have supposed Milton was indebted for some of his noblest conceptions. He then arose from sleep, with his song fresh in his memory, and went on composing until morning, when he hied him to the *tun-gerefa*, or chief magistrate of the place, and told him of the gift which he had received. This dignitary took him to St. Hilda, the Abbess of Whitby, who, after testing the dumb poet who had found a tongue, called a council of learned men and scholars, who, after due examination, acknowledged his pretensions, and induced him to devote himself to a religious life in the neighbouring monastery. Here he spent many years, turning into Saxon verse the various themes of Divine revelation, and, after a long and blameless life, finished his course with the praises of God upon his tongue. When he lay on his death-bed, he inquired how near it was to the hour when the brethren should arise and sing their matin-song. They answered, it was not far off. Then said he, "Well, we will wait until then;" and so they signed him with the sign of the cross, and, his head declining on the pillow, he fell into a gentle sleep, and so passed away.

The concluding words of the story I must give in the original.

"Ond swa wæs geworden, thætte swa swa he hluttere móde, and bylewite and smyltre willsumnesse Drihtne theowde, thæt he eac swylce swa smylte deathe middan-geard wæs forlætende, and to his gesyhthe becom. And seo tunge the swa monig halwende word on thæs Scyppendes lóf gesette, he tha swylce eac tha ytemestan word on his herenesse, hine sylfne seniende and his gast in his handa bebeodende, betynde."

"And so it came to pass, that even as he served the

Lord with a sincere mind and simple and gentle devotion, in such wise he was dismissed from earth with a gentle death, and attained the (heavenly) vision. And the tongue which had uttered many wholesome words on the love of the Creator, even the last utterances in his praise, blessing himself and committing his soul into His hands, so came to silence."

Whatever inferences we might be disposed to draw from the laws, and however rude in many respects the state of society in the ninth century might be, the people for whom this was written in their native tongue must have had much that was gentle and noble in their feelings and habits.

At this point we are naturally led to take a glance at the mental condition of the Teutonic races at this early period, when Tacitus says, "*Literarum secreta viri pariter ac femine ignorant.*"\* This must be taken with some qualification. It is quite true as regards the Greek or Roman method of writing, but there are indications that the Runic system of notation and letters was in existence previously. The following passage of Tacitus has been a puzzle to his editors and annotators. In reference to the mode of taking auspices and casting lots, he proceeds: "*Virgam, frugiferae arbori decisam, in surculos amputant, eosque notis quibusdam discretos, super candidam vestem temerè ac fortuitò spargunt: mox si publicè consuletur, sacerdos civitatis sin privatim, ipse paterfamiliae, precatus deos, cœlumque suspiciens, ter singulos tollit, sublato secundùm impressam ante notam interpretatur.*"

Nothing could more clearly indicate the Runic method of writing, as it would be described by a person ignorant of its true meaning. The "*virguli*," or twigs, of Tacitus, are equivalent to the "*Buch-stäben*," or beechen rods, of the

\* *De Mor. Ger.*, sec. 19.

Runes; and the "notis quibusdam," the "impressam ante notam," are the cuts, scratches, and lines which indicate the letters. These were originally cut on the edges of the staff, and when the system was transferred to engraving on stone, or writing on parchment, the upright staff was still represented, and the letters distinguished by lines issuing from it. This system could only be limited in its application, and was superseded, first amongst the Goths of Mœsia, in the fourth century, by an alphabet invented by Bishop Ulphilas, founded on the Greek; and amongst the Franks and Anglo-Saxons, in the fifth and sixth centuries, by alphabets derived from the Latin. The Anglo-Saxons attained to great eminence as scribes and illuminators. At the time of king Alfred, literature was certainly in demand. The Scriptures had been translated into the native tongue, and Alfred himself translated Bede's *History*, *The Philosophy of Boethius*, Apollonius of Tyre, and the *History of the World* by Orosius, for the use of the common people.

Amongst the Franks the gospels were translated in the seventh century; and about the tenth century Willeram translated the Psalms into the Alemannic or old High German dialect.

Handwriting amongst the laity of the Franks and Alemanni was extremely rare. Indeed it seems to have been regarded with suspicion. Deeds were usually executed with the seals of the parties, and witnesses do not appear to have been insisted on. In the case of a party signing his name the law says, "Swær hantvest machet, der sol zu dem minsten, siben man setzen, daran die geziuge sien; ist ir mer daz ist auch gut." "Whoso signs his name, must have at the least seven witnesses; should there be more, it is well."

The witnesses were allowed to append their seals in place of signing.

We have not in the laws many indications of the condition of manufactures and the arts.

By the Alemannic code it was not lawful to erect a building more than three stories high, without the consent of the *Lantrihter*, or magistrate of the district. A wall might be built round the court, but not of greater height than could be reached by a man sitting on a horse; nor was it allowed to have the wall crowned with a battlement or parapet.\*

Even at this early period the vexed question of injury to light by adjoining buildings was the subject of legislation.

“Und zimmert ain man ain huse, un will sin nachgebur ain hus an in zimmern, so sol erz in der hoehe rihten daz sin lieht niht verzimmert werde.”

“If a man builds a house, and his neighbour builds another adjoining, the latter shall so carry it up that the light of the first be not injured.” Then follow directions as to procuring satisfaction.

Connected with this is rather a quaint, but effective law. “If any one shall build a boat or anything else with another man’s timber, the boat shall belong to the man whose timber has been used.”

The king’s highway (*kungez straz*) was to be sixteen feet wide, for the alleged reason that two vehicles might pass each other. The bridges were so narrow that it was necessary to enact a law, that the first comer, whether loaded or unloaded, should have the right of way. Whoever came first to the mill was to have the prior right of grinding.

Corn mills were of such importance that they had to be protected by special legislation. By the Salic laws, whoever stole corn from a mill was subject to a penalty of 600

\* *Jus Aleman.*, c. 132.



denarii to the miller, and the same amount to the owner of the grain, besides restoring the goods stolen, or their value.

Buying and selling were subject to various restrictions. In the laws of King Edward the elder, and of Athelstan, it is enacted: "Ond we cwædon thæt man nænne ceap ne ceapige butan porte ofer twentig penega, ac ceapige thær binnan on thoes port-gerefan gewitnesse, oththe othres unlygenes mannes; oththe eft on thara gerefena gewitnesse on folc-gemote." "And we ordain that no man buy any goods without the port above 20 pence, but he must buy therein, on the evidence of the port-reeve or other credible man; or, after, on the evidence of the reeves at the folk-mote."

The term "port" is borrowed from the Roman law: "Portus est conclusus locus quo importantur merces et inde exportantur." These restrictions on commercial transactions were doubtless imposed in order to secure the tolls, or market dues.

All transactions amongst the Anglo-Saxons required to be verified by witnesses. The laws of King Ine (about A. D. 700) enact that if a chapman traffic through the country, he must do it before witnesses. If this was not done, and any stolen property could be traced to him, he had to pay a fine of 36 shillings.

Trade of any kind is scarcely noticed either in the Salic or Alemannic laws, and we have little means of ascertaining the condition of industry in those countries from the fourth to the tenth century. The colloquy of Archbishop Alfric gives some idea of the trade of England in the tenth century. The mariner is asked, "Hwylce thinc gelædst thu us?" "What goods dost thou bring us?" The reply is, "Pœllas and sidan, deorwyrthe gymmas and gold, selcuthe reaf, and wrytgemange, win and ele, ylpes ban and mœstling, ær and tin, swefel and glæs, and thylces fela." "Purple

and silk, precious stones and gold; various garments, perfumes, wine and oil; ivory, brass and tin; sulphur, glass, and many other things."

The mention of tin amongst the imports is somewhat singular. We should rather have expected to find it an article of export. We have no distinct account of the exports which went to pay for these articles of luxury. Wool and fells no doubt formed a large proportion. Horses were also in demand, and there is reason to believe that slaves were sent abroad in considerable numbers, even down to the time of the Conquest.

The coined money in use amongst the Franks, consisted of *solidi* and *denarii*, one *solidus* or *sol* being equal to forty *denarii*. The *solidus* was originally a gold coin, and in the fifth and sixth centuries, was the price of an ox. By successive and constant deteriorations, from gold to silver and silver to copper, it at length degenerated into the French copper *sou*. Bearing this in mind, the *solidus* in the Salic laws must have been equal in purchasing power to at least £10 sterling. The fines, therefore, imposed by the laws were sufficiently heavy as a punishment. Fifteen *solidi*, equal to £150 sterling, seems a very severe penalty for squeezing the hand or finger of a woman, and would one may think be a sufficient protection for the fair sex under ordinary circumstances.

Amongst the Alemanni, the coins were pounds, shillings and pence, as with us; the purchasing power much greater, from the greater scarcity of precious metals. The Anglo-Saxons had a great variety of coins. The pound, shilling and penny, with their subdivisions, have descended to us. Their relative value as well as their purchasing power, have undergone many modifications before settling down to their present condition.

The laws and customs connected with the tenure of land,

at the period we are treating of, are curious and interesting. Amongst the Franks wills were unknown. Succession to property was imperative, according to a fixed rule. This law of succession presents a singular admixture of the admission of female rights in some cases, and the abnegation of them in others. If a man died and left no sons, his father or mother, if living, succeeded. If the parents were dead, the brothers and sisters had the next claim; thence it went to the sisters of the father, then to the sisters of the mother; failing these, to the next of kin by the father's side. Then comes the remarkable proviso, "*De terra verò Salica, nulla portio hereditatis mulieri veniat; sed ad virilem sexum tota terrae hereditas perveniat.*"\* These few words constitute the celebrated Salic law, which has powerfully influenced the destinies of some of the greatest kingdoms of Europe. There is an apparent contradiction between the former and the latter portions of the law; females having a preference in the earlier clauses, but being absolutely cut off by the last. Two explanations may be given of this. The *alodis* may be understood to include the personal or moveable property, as in other cases it is known to have done; or the "*terra Salica*" may apply only to the conquered lands held by military service.

In the Alemannic and Anglo-Saxon laws wills are recognised, but the succession to land is strictly limited to the male issue, so long as it exists. In neither, however, is there the same absolute prohibition of female inheritance, as in the Salic laws. In the laws of Alfred it is enacted that if a man has land descended from his ancestors, he shall not dispose of it out of his own family, but there is no limitation in favour of heirs male. The laws of Henry the first adopt the Salic law of inheritance almost word for word, the singular

\* *Lex Salic*, c. 42, *De alode*.

preference of the female line in certain cases included; but the prohibitory clause is qualified as follows:—“*Dum virilis sexus exstiterit, et hereditas ab inde sit, femina non hereditetur.*” This is still the law of England in relation to landed property, modified, however, by the power of disposing by will.

By the Salic law, although lands could not pass by will, they might be alienated during life time by going through a formal process, and with the consent of the king.\*

The feudal system of military tenure is recognised in the Alemannic laws,† but is not found either in the Salic or Anglo-Saxon codes.

By the Salic law it appears that the fields were surrounded with hedges, as with us; severe penalties are imposed on injuring or defacing them. Trespass, especially amongst growing crops, was visited with a heavy fine.

The laws connected with religion present remarkable differences amongst the three nations which we are considering. There is every probability that the Salic laws were enacted before the conversion of the Franks to Christianity, though doubtless revised thereafter. The only reference in these laws to religion is the 58th: “*De incendio Ecclesiae sive homicidiis clericorum,*” which enacts that the burning or exspoliation of a church shall be compensated by a fine of two hundred sols. Whilst the *wer-geld* of an ordinary freeman was fixed at two hundred sols, the homicide of a deacon was four hundred, and of a priest six hundred sols. It is evident that up to that period, probably about the reign of Clovis, the ecclesiastics had not attained any very high degree of ascendancy.

Turning to the Alemannic code revised by Charlemagne

\* *Lex Salic*, tit. 48, *De affatomiæ*.

† *Jus Aleman.*, c. 3, *De septem clypeis militaribus*, c. 18, *Quod Dominus Castri*.

in the eighth century, we find, as we might naturally expect from the hand of the great champion of the Church, the whole code imbued with ecclesiastical influence. After the introduction, which is the form of a religious homily, immediate reference is made to the Pope, as the source of all authority on earth: "Daz ist der Babest, dem Got gewalt verlihen hat, der sol an Gotez stat rihten hie uff ertrich untz an den jungsten Tag." "This is the Pope, to whom God has granted power, who must in God's stead judge here upon earth to the last day." The whole code breathes a fierce spirit of persecution and intolerance. The first chapter enacts that if any person has been for six weeks and a day under the ban ecclesiastic, he must be handed over to the secular arm for punishment.

Respecting heretics, the ecclesiastics have to enquire and judge, and, if convicted, they are to be handed over to the secular arm; then, proceeds the law, "Dem geriht ist also, man sol si brennen uf ainer hürde." "Their sentence is, to be burned upon a hurdle." Whoever aided them was to be subject to the like punishment. Any prince supporting or cherishing heretics was to be forthwith excommunicated, and if within a year he did not repent, he was to be deprived of all his lands and dignities. "Ditz," says the law in continuation, "sol der Babest kunden dem Künig und allen weltlichen Rihtern die suln dez Babestz geriht uest machen mit ir geriht." "This the pope shall make known to the king and all secular judges, that they may confirm the pope's decree by their authority."

The right of sanctuary was of course claimed and exercised by the priests, who in every part of the code override the secular jurisdiction.

Far different from this is the spirit of the Anglo-Saxon laws. From the reign of Ethelbert, in the sixth century, down to the conquest, there is not in the

numerous codes handed down to us any trace of religious persecution. The priest is liable in the same manner as the layman to the secular law. No difference is made between his *wer-geld* and that of any other subject of equal rank. In fact, he seems to have required special protection, being classed with the foreigner in the laws of Edward and Guthrum (about A. D. 900). "Gif man gehadodne oththe æltheodigne thurh enig thing forræde, æt feo, oththe æt feore thonne sceal him cyng beon oththar eorl thær on lande, and biseop there theode, for mæg and for mund-boran, buton he elles otherne hœbbe." "If any one injure a priest or a stranger, either in goods or life, then shall the king or the earl of the district, or the bishop of the people, be to him for kinsman and protector, unless he have another."

Priests neglecting their duty were amenable to secular law. If a priest misdirected the people as to a festival or a fast, he was to pay a fine of 90 shillings amongst the English, and three half-marks amongst the Danes.

The bishop occupied a very important and dignified position amongst the Anglo-Saxons. The first law of the earliest Anglo-Saxon code enacts that the bishop's property, if stolen, shall be restored eleven-fold. He is the only man besides the king whose word was to be taken without an oath. "Biscope's word and Cyninges sie unlcægne buton athe."\* His *wer-geld* was fixed at the same amount as an ealdorman's, 8000 thrymsas. But with all his honours he was amenable to the law, even for neglect of clerical duties. "Let the bishops and abbots," says the ordinance of Ethelred (A. D. 1008), "submit to the law, and live according to their rule."

There is in many of the Anglo-Saxon codes a noble sense of righteousness, justice, and freedom. Take the

\* Wihtræd's *Dooms.*, No. 16.

following introduction, from the *Liber Constitutionum* of Ethelred, A. D. 1008.

"This is the ordinance that the king of the English and the ecclesiastical lay 'witan' have chosen and advised."

This is the first; that we all love and worship one God, and earnestly hold one Christian belief, and every heathenship entirely cast out; and this we all have both with word and pledge confirmed, that under one kingdom we will hold one Christianity.

And the ordinance of our lord and of his witan is, that right law be established, and every unlawfulness earnestly abolished; and that every man be regarded as entitled to right; and that peace and friendship be rightly observed within this land, before God and before the world."

This is not mere verbiage, for the whole detail of the laws is carried out in the same spirit of justice and freedom. In perusing these old laws, amusing illustrations of manners and customs occasionally crop up. Amongst the Franks the hair was worn long by both sexes, and was an object of great pride and attention. Cutting off the hair, or shaving, was considered a great disgrace. We find in the Salic code the following law: "Si quis puerum crinitum sine voluntate parentum totonderit, mille octingentis denariis, qui faciunt solidos quadraginta quinque, culpabilis judicetur." To shave the head of a girl was punished with the heavier penalty of 62½ sols, or 2500 deniers.

Calling names has been a weakness of human nature in every age, and when carried beyond a certain pitch is usually subject to punishment. The Salic code informs us what were the complimentary epithets visited with punishment 1300 years ago. If one called another a little fox, "vulpeculum," he was fined three sols; but if he called him a hare, "leporum," he had to pay six sols fine. For a man to call his neighbour "squint-eye" involved a penalty

of 15 sols; but if a lady had an imputation cast on her chastity, it involved a fine of 45 sols.

Our Saxon ancestors were fond of convivial parties and ale drinking, as many of their descendants continue to be. In the laws of Hlothære and Eadric (seventh century), it is provided that if a man draw a weapon where men are drinking, even if no harm ensue, he must pay one shilling to the master of the house and 12 shillings to the king; if blood be drawn, he must pay 50 shillings to the king.

The insecure state of society at that period is shewn by the following law of King Ine (seventh century); "Gif feorcund mon oththe fremde butan wege geond wudu gonge, ne hrieme ne horn blawe; for theof he bith to profianne, oththe to aliesanne." "If a farcoming man, or a stranger out of his way, passes through a wood, and neither shouts nor blows his horn, he is to be considered a thief, to be either slain or fined."

I feel that I have extended this paper beyond the ordinary limits, but much more would be required to render the picture complete. The character of a nation is certainly exhibited in its laws; and in comparing the codes of the different Teutonic races in early times, it is pleasant to find in the Anglo-Saxon codes a spirit of justice, freedom, kindness and goodwill, which compares advantageously with the rude simplicity of the Salic code, and the complicated verbiage and intolerant enactments of the Alemannic laws. A fiercer and more repressive system was introduced at the Conquest, but by degrees the Old English spirit of individual freedom and equal justice again asserted its right, and finally gained the ascendancy; and at a future and distant day, should any curious antiquary institute an inquiry into the laws of England in the nineteenth century, with the object of throwing light on the character of



the people, he will find, on the whole, that the tendency and nature of our institutions could not be better described than in the noble words of King Ethelred, 850 years ago, with which I will conclude.

“It is the ordinance of the ‘witan,’ that Christian men be not, for altogether too little cause, condemned to death; but in general let mild punishments be decreed for the people’s need; and let not for a little God’s own handiwork be destroyed, which he dearly bought; but let every deed be heedfully distinguished, and doom according to the deed be moderated in degree; so that before God it be fitting, and before the world bearable. And let him who judges others bear in mind, very seriously, what he himself desires when he thus speaks, ‘And forgive us our sins, as we forgive others.’”

## SEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, 27th January, 1868.

J. BIRKBECK NEVINS, M.D., VICE-PRESIDENT,  
in the Chair.

Ladies were invited to attend this meeting.

Mr. Picton exhibited Westwood's splendid work, "Illustrations of the miniatures and ornaments of the Anglo-Saxons and the Irish," and the famous A.-S. fibula or brooch from the Mayer collection, which was dug up at Kingsdown in 1771, by the Rev. Brian Fawcett. Mr. Picton then entered into a series of observations, with reference to the discussion on his paper at the last meeting, in which he cited proofs from Lappenberg, Kemble, &c., in support of certain facts he had advanced in his paper, but which had been questioned during the discussion.

Mr. Flück next exhibited several specimens of relics and other antiquities from the Lacustrine dwellings of Switzerland, and gave an interesting account of the origin and progress of these discoveries.

After the discoveries made in 1853-54, by Dr. F. Keller, at Meilen, on the Lake of Zurich, which he fully described shortly after in his work, "Die Keltischen Pfahlbauten in den Schweizerseen," many others, who took an interest in archæological matters, made researches in the different Swiss lakes, and the result was that up to 1864 more than two hundred of these "pfahlbauten," or lake dwellings were discovered. During the summer of that year the

attention of M. de Bonstettin and Dr. Jahn, professor of archæology at the University of Berne, was drawn to a spot in the Lake of Morat, near Greng, a chateau belonging to Count de Pourtalès, and situated about half way between the towns of Morat and Avenche (ancient Aventicum).

Up to that time this peculiarly constructed spot had always been considered by the inhabitants of the district as the remains of an ancient jetty, built by the Romans; but when the above-mentioned gentlemen brought to light a number of axes and chisels made of nephrite, set in stag-horn handles, implements made of flint, wood, and bones belonging to different animals, &c., it was evident that the structure was a lake dwelling, belonging to the earliest period of the stone age.

Further researches had to be abandoned on account of the high level of the water, and it was only in autumn, 1865, that the entire structure and its relic bed were properly brought to light. Count de Pourtalès, desirous of converting the place into an artificial island, set a number of men to work, and it was during the process of dredging that all the beautiful specimens, which now compose the fine collection at Chateau Greng, were discovered.

Among the best preserved were celts and hammers of nephrite, beautifully polished; saws, knives, arrow-heads, &c., of flint; round perforated stones, the use of which has been differently explained. Some call them sling stones, being projectiles used in warfare; but considering the the beautiful workmanship, it is not very probable that they were used for that purpose. Similar stones, called hurling stones, were used by the Indians in a somewhat similar game as the Yorkshire "spell and knurr," and the game played by the Swiss peasants called "hornets." This explanation seems to have more in its favour than the former. Their use as weavers' weights is just as impro-

bable, because such weights were made of baked clay, and it is quite as likely that many of them were used as spindle-worles.

Other implements were made of bones, wood, and staghorns, such as needles, pins, bodkins, spoons, &c., Among the bones found were those of the martin, badger, weasel, wolf, fox, elk, squirrel, goat, aurochs, bear, boar, dog, &c. Of vegetable remains we have the cherry, wild apple, pear, wheat, flax, &c. The pottery is very primitive, with hardly any attempt at ornamentation, and is made of coarse clay mixed with fine gravel.

The construction of this settlement is the same as most of the others of the same age, and those having an interest in such matters will find the necessary information in the very interesting and instructive work of Dr. F. Keller, which has been translated into English. As to the origin of the settlers, the age of the dwellings, &c., the same book contains everything that can throw any light upon these questions. The specimens shown to the society, and which Mr. Moore has accepted for the Free Library and Museum, are all from the settlement at Greng.

The following Paper was then read :—

ON THE  
JURISPRUDENCE & EDUCATION DEPARTMENTS  
OF THE  
SOCIAL SCIENCE CONGRESS AT BELFAST.  
BY MR. A. BARUCHSON.

ELEVEN years have passed since what we may now call another British Institution was first founded. I speak of the "National Association for the Promotion of Social Science," which was mainly originated, in conjunction with other able and zealous men, by Lord Brougham, the veteran philosopher, statesman and philanthropist.

Its utility, like that of many other new institutions, was questioned at first. As, however, meeting after meeting was held annually in the large centres of our commercial and industrial population, presided over and attended by the most eminent men in politics, science and letters, of this and other countries, the objects of the Association became better understood. Lord Dufferin, the President, in his address inaugurating the recent Congress in Belfast, defined its action thus:—

"The acquisition of such knowledge as will enable the human communities, by which the earth is inhabited, to reach the highest limit of physical and moral well-being, which is compatible with the original condition of their existence."

In 1862, an International Social Science Association was formed in Belgium, for the same purpose as ours. The General Secretary, in his address at the opening of the first Congress in Brussels, thus described the programme of its intended operations: "To develop the study of the social sciences, to guide public opinion towards the most practical

means of improving civil and criminal legislation, to perfect and generalise instruction, to extend and determine the mission of literature and art in modern society, to augment public wealth and direct its proper distribution, to ameliorate the physical and moral condition of the labouring classes, and lastly, to aid in the diffusion of all those principles which give force and dignity to nations." The speaker added, that the Congress was desirous *not* to obtain decisions on the controverted subjects, but to draw forth ideas, views and propositions, which could, in matters of legislation, art, instruction, benevolence, health and industry, remove doubts, dissipate shadows, disperse prejudices, and throw full light upon social science, which is constantly transformed, and for which the truth of yesterday is not that of to-day.

Although Lord Dufferin and Mons. Couvreur used different language in their definitions, the objects in view are nevertheless identical.

The annual meetings of the Association have already been held in Birmingham, Liverpool, Bradford, Glasgow, Dublin, London, Edinburgh, York, Sheffield, Manchester and Belfast. Besides the regular attendance of those members who take a special interest in the society, an accession of new members takes place in every town where the meetings are held. Information on many important topics, local and general, is given, and instruction afforded, by moving each year to a new centre, and exactly to and from those classes which exercise the greatest influence on society; nor must the important fact be overlooked that the audiences include a large number of the gentler sex, mothers, sisters, daughters, who not only have the power of aiding many of the useful and benevolent projects proposed and discussed, but, what is even of greater value, have the tender feelings, the loving and devoted hearts, to give a helping hand to every project that can benefit humanity.

The transactions of the annual meetings are published, and may be considered as "vade mecums" of social science in all its numerous ramifications.

It was my original intention to review some of the most important subjects discussed in each of the five departments of the Association; but, on consideration, I found that the time usually devoted by this society to a paper would allow me only to dilate on some points in connexion with the first two Departments, viz., those of *Jurisprudence* and *Education*.

The President of the first Department, on Law and Jurisprudence, Chief-Justice O'Hagan, an impressive and able orator, expressed himself strongly in his address on the imperfect education, and consequently the deficient attainments, of the legal profession of the United Kingdom, compared with Foreign (especially Continental) Jurists. Although he rejoiced to say there was exceptionally, in spite of these defects, a phalanx of great names, such as Romilly, Macintosh, Brougham, &c., which would have shed lustre on any profession or country, still he much regretted our short-comings in this respect. The time had arrived when a liberal culture of the law as a science was indispensable. The study of Roman jurisprudence, and of the codes and laws of foreign countries, was of great value, not only in our own immediate practice, but also in the great work of digesting a code of laws for this country; a work, which had long been wanted, was advocated by the three last Chief-Justices, and was emphatically approved by the Royal Commission in 1844 and the Parliamentary Committee in 1866.

It is stated that the judicial decisions and dicta on which the judgments now given in our courts are based, amount to no fewer than a hundred thousand, and are comprised in thirteen thousand volumes, the most compact

edition consisting of forty five densely printed quarto volumes.

The several points to which the President of the first department specially directed the attention of his auditors, and many of which afterwards became subjects for discussion, were :—

The Condemnation of Centralisation of the Law Courts in London. Whilst he considered the harmonious decision of all the Courts most desirable, and that the judgments should be uniform and homogeneous, local courts, with local bars of men of talent, were equally indispensable and more in harmony with the British principles of self-government and de-centralisation. He did not think that London should be the legal metropolis of the United Kingdom. What he desired was, an assimilated code, but independent judicature. We have ourselves proofs in Liverpool of the disadvantage and positive injury occasioned by the centralisation of some departments of justice in the metropolis. I may name the Admiralty, and also the Chancery Court, especially the former, which operates to the great detriment of our merchants and shipowners. Happily, our Chamber of Commerce has for some time past endeavoured to get the jurisdiction of the Admiralty Court extended to Liverpool, with an independent Judge; and I trust the time is near when this request, so urgently needed, will be granted.

The speaker then alluded to International Law, which must undergo modification to adapt itself to the altered times in which we live. The dispute about the *Alabama*, between this country and the United States, is sufficient proof that International Law must be more clearly defined, in the interest of an enduring peace, and in order that reciprocal protection may be extended to the interest of commerce.\*

\* The Hon. Dudley Field delivered an able address on International Law, on the closing day of the Congress.



He was also desirous that perfect security should be established for the property which intellect creates. He further advocated the importance of a Public Prosecutor for England, as also a Court of Criminal Appeal, rather than that the responsibility and power should be longer placed, *in matters of life and death especially*, in the hands of the Home Office. I believe that England is the only country in Europe where no Public Prosecutor, nor a Criminal Court of Appeal *on facts*, exists; even in Ireland and Scotland, the former official is ingrafted on the administration of justice; and it is well understood that many evil-doers in England escape punishment for want of so important and useful an officer as a public prosecutor. Justice O'Hagan further recommended that the Encumbered-Estates Court should be extended to this part of the United Kingdom; and that the Registration of Titles recently introduced in England might become a reality, and be extensively availed of by less cumbersome and less expensive processes. The Chief-Justice reminded his hearers that in this and other legal respects Ireland had long been in advance of England.

The laws relating to the property of married women were also alluded to during the Congress, as most unsatisfactory and unjust, often leading to a degree of suffering, by mothers and children, much to be deplored. We are in this respect greatly behind our French neighbours. These all were considered deserving the attention and serious consideration not only of those who study jurisprudence as a profession or as a science, but of a reformed Parliament, that by wise legislation we may maintain the settled order in which progress grows.

Revision and Restoration of Local Administration of Justice, as it existed during the Roman, Norman, Lancastrian, and Tudor periods, was mentioned at this Congress, as it had been also at previous ones. Our forefathers

seem to have been better aware than we are, of the necessity for local courts in commercial centres, to settle differences and suits, as it was an established rule that, when and wherever a fair was held, a court should daily sit, although that court often consisted only of the manorial chief. If it was necessary then, how much more stand we in need of it now, when in one hour the transactions in a town like Liverpool are probably of greater importance than the whole transactions at one of these fairs. In course of time Local Permanent Courts arose from these fairs; we still have one such in the Passage or Borough Court, which might well be remodelled, and its jurisdiction so enlarged as to answer all the purposes of commerce. It certainly would be more congenial to English ideas and practice than the tribunals of commerce abroad. On this subject also, the Liverpool Chamber of Commerce held some time ago a conference with the Law Association, which showed every disposition to act in harmony with the Chamber's suggestions. Similar ancient Courts of Record in Manchester and Salford are about to be amalgamated, and are to hold daily sittings. I am aware the County Courts do partially supply the want of permanent courts, but their jurisdiction is limited to small amounts.

Justice O'Hagan expressed himself warmly on the withdrawal of the Professors of the Irish language from the Queen's and University Colleges in Ireland, by which the study of such authors as O'Curry and O'Donnovan will be lost to the Irish student. This fact surprised me not a little; and appeared to resemble somewhat the action of Russia with the Poles, who are compelled to abjure their national language; and also of the Government of the Netherlands previous to the Belgian revolution, when Holland forced Belgium to plead, and to furnish all legal documents, in the Dutch language, which was one of the causes that led to the

revolution in 1831. The difference in the jury-laws between England and Scotland was also discussed, and on the whole, the Scotch system, where a majority of nine, after three hours' sitting, may form a lawful decision, was considered the more desirable.

In passing from this department to my next subject—Popular Education—I must commence with a remark which applies equally to Education, Medicine, and Law. Strong objection may be made to the mode by which many students for the legal and medical professions are instructed or prepared for their high calling; and to the facility with which they obtain those important positions on which in one case the life and health, and in the other the prosperity and often happiness and misery, of families and individuals depend.

In Holland, Germany, and on the Continent generally, a member of the one or other of these professions usually studies three years at one of the universities, having first passed through a course of some years' instruction at a gymnasium, in the classics and modern languages, mathematics, ancient and modern history and literature, natural philosophy, political economy, &c. Finally, the examination and promotion of the candidates for either profession are of the most searching description.

Now, how do matters stand in this country? We have two renowned and ancient universities, but their beneficent action is so circumscribed, and they are hampered by so many restrictions and ancient regulations and customs, that but a very limited number of the two professions come from either university. It was stated at a previous Congress, by the Rev. B. Zwecke, chaplain to the Queen, that "in the capital of an agricultural county, with a population amounting to more than 40,000, there was not a single individual, with the exception of some of the clergy, who had received a

university education. In fact, this disregard had now become so wide-spread, that if the bishops were to withdraw the rule they generally act upon, requiring from candidates for holy orders certificates, which imply a university education, our universities would literally collapse for want of students."

In a recent work by the Rev. Mark Pattison, the Rector of Lincoln, *On Academical Organisation*, these statements of Mr. Zwecke are fully confirmed. He shews that "the universities, especially Oxford, lose their hold more and more on the wealthier classes, and one-third of the students are paid by bounties for coming there."

Even the barrister, the *crème de la crème* of the legal profession, is not obliged to receive a university education. True, examinations have to be passed. These however are greatly assisted by what is usually called the art of cramming. In fact, the road is too easy to insure either talent worthy of the name or plodding mental labour. I find, on enquiry, that £10 has been lately paid to a crammer in London, who coached a candidate for his examination as solicitor; a moderate amount, forsooth, to obtain the diploma of the foreign *avocat* or even *avoué*.

It is then by no means surprising that the ordinary members of the legal profession, viz. solicitors, occupy a much higher position on the Continent than they do in this country. Even the chemists or dispensers of medicine on the continent, although they do not attempt, nor are they allowed to usurp, by prescribing medicines, the place of the regular medical practitioner, have to receive instructions, or attend such lectures as will enable them to pass an examination in medical botany, chemistry, and compounding of medicine. Hence the apothecary or chemist is considered a *bona fide* member of a learned profession. I know of at least one instance in Holland, and in the town in which I resided, where the chemist I employed was called from the

dispensing of medicine to the professorship of chemistry at the university.

But I rejoice to see signs of better things in professional education. These defects have not escaped the attention of the leading members of the legal and medical professions, and stricter measures have been, and others are about to be, adopted, to improve and extend the education of those who aspire to legal or medical honours and emoluments.

It was argued and admitted at the Congress that though many reforms had been introduced at the universities, many more were required. The fellowships had been turned from sinecures into prizes, but they were sinecures still; and the whole system of prizes and of educational endowment generally needed revision. The requirement of celibacy was almost universally retained. This is fatal to any institution in which it is imposed. Where the rule of celibacy remains, the lay-fellows will go off to other colleges, in which they can marry, and desert educational pursuits; whilst college tutors will continue to be clerical fellows, looking forward to college livings, and confining themselves to studies more or less connected with the clerical profession. Hence, clerical ascendancy predominates in Oxford, and in a minor degree in Cambridge also. Now, institutions which are *sectional*, cannot be *national*, nor educate the *nation*.

Our old universities should become the centres of a liberal education of the very highest order, the education of those who are destined for scientific and intellectual callings.

Let us hope that the universities of Oxford and Cambridge, as also Dublin, may, ere long, become like their sister institution in the metropolis, more enlarged and useful, and better adapted to the requirements of the age in which we live.

In dealing with Trinity College, Dublin, the same

principles ought to be applied; it should open its portals wide. In order to educate the youth of the Irish nation, it has to be expanded beyond the limits of sect or party, so as to embrace all students, and thus accomplish the objects for which universities are intended, viz., to give power and strength to the intellectual life of nations. To place universities on such unsectarian bases, with the motto of "equal rights to all religions, honours and emoluments to merit only," would do more to diminish ritualism in the church than all parliamentary committees, the unmeaning and fruitless periodical convocations of the clergy, or the powerless efforts of bishops and congregations.

Let me here refute the charges made by our esteemed and learned President, Dr. Ginsburg, in his inaugural address, against mercantile Liverpool, as inferior, in the patronage it bestows, and the interest it takes in art, science, and literature, to other mercantile towns in this and other countries. I stated my surprise at the time, and believed that my respected friend, who on the one hand like myself has travelled much, and on the other hand has resided sufficiently long in Liverpool, should have judged more correctly. To arrive at an impartial conclusion, we have to look at a merchant's occupation and life in a town known as more enterprising and more speculative than any other in Europe; a town comparatively of yesterday; not like Amsterdam, Antwerp, and Hamburg, the people of which are more phlegmatic, and where trade is pursued calmly on fortunes made in times past. Consequently, were it required, some apology might be made for the merchants of this town, but I believe no such apology is necessary. Our merchants may confidently be compared with those in the ancient seats of commerce, as well as with those of modern Europe.

We find in Liverpool not fewer than between forty and

fifty art collections, some of considerable value; besides these, there are but few houses without some works of art; and high prices are offered whenever any of merit are on sale. The London artists proclaim loudly, that they receive more patronage and support from the merchants and manufacturers of Lancashire, than from any other part of the United Kingdom; and I would ask, have Gibson, Spence, and Ansdell, three Liverpool artists, found no patrons in Liverpool? The tinted Venus of Gibson was a commission of a Liverpool merchant; so was the Angel's Whisper of Spence; and many others can be named. For several years two annual exhibitions have been maintained here. They were only discontinued through the jealousy and contracted ideas of the local artists; and I can testify, as one of the committee, to the cheerful, willing, and liberal support given to these institutions by the merchants of Liverpool, far beyond what could, I believe, be obtained either in any commercial city abroad, or even elsewhere in England.

I have observed that Mr. Gower, of Marseilles, connected formerly with Liverpool, has recently bequeathed his picture gallery, of considerable value, to this town.

And I am convinced, from the conversations I have had, that not many years will elapse, after the permanent Gallery of Art about to be built by the corporation is opened, before Liverpool will possess a collection of works of art, gifts from its wealthy inhabitants, either during their lifetime, or bequeathed at their death, which will reflect lustre on, and add to the intellectual enjoyment of, our town.

Such an institution of art will well harmonise with our temples of music, of which Liverpool may be justly proud. The Philharmonic Hall, erected at an immense cost by our merchants, is supported at a considerable expense annually, and not only is it always well attended by the wealthier

classes, but the galleries are equally well filled ; a proof of the love of music among our people generally. Besides this noble building, we have the St. George's Hall and that gem—the Small Concert-room—continually in use, besides several minor halls.

Now as to Literature and Science. In addition to the gifts of the Free Library by a Liverpool merchant, and of a valuable Museum of Antiquity by another of her liberal and intellectual citizens, a respected member of the Literary and Philosophical Society ; we find, not only gifts presented constantly to these valuable institutions, but they are also willingly supported by a municipal rate, voted by the Town Council, composed mainly of merchants.

A School of Science has been established, and is supported by voluntary contributions ; and we constantly see gentlemen lecturing in the town and suburbs on useful and interesting subjects. A new, elegant and commodious Theatre has lately been erected ; and, I need not say, all this is done by the public spirit of our merchants. Three educational establishments, the Royal Institution, the Collegiate Institution, and the Liverpool Institute, owe their existence to the desire of our wealthier citizens to impart a superior education to the youth of Liverpool.

We must not lose sight of the fact that our merchants live mostly in the suburbs, and that after a day of mental labour they have their libraries at home. There is scarcely a town-house or a suburban villa without one. Our daily and periodical press demand great attention, from the part which each Englishman is expected to take in politics, local and general. The voluntary and unpaid government of the docks and the town, and of the various useful and charitable institutions, absorbs also much time. My memory recalls a fact worth recording here. During the mayoralty of Mr. S. R. Graves, Mr. Petherick, Consul of



Khartoum, was in Liverpool; Mr. Graves called a meeting in the cotton sales-room, which was well attended. When Mr. Petherick explained his plans to assist Mr. Baker in the discovery of the sources of the Nile, subscriptions were at once liberally handed in to the Royal Geographical Society, to aid in this scientific discovery; and I am sure, were our merchants called upon to contribute to and promote in a greater degree, by their time and wealth, art, science, and literature in their native or adopted town, they would be found ready and willing, as they are in the other duties of enlightened and Christian citizenship.

How stands it abroad? Are the collections of works of art, or the libraries in private houses, as numerous as in this town? My knowledge of merchants' residences on the Continent is totally at variance with what our President in his address gave us to understand. Are they spending their evenings amidst literature, daily and periodical (if not more solid), in the family circle? No; you find many of the leading merchants all over the Continent in the evening at their clubs or cafés, unless they attend the theatre; and shall I say they are playing? no, *rather gambling*, rouleaux of gold being lost and gained! My introduction as a stranger into the clubs of Bordeaux, Marseilles, Brussels, &c., has enabled me to judge in this respect accurately; and I may safely assert, that whilst in Liverpool perhaps one gentleman in five may spend his evenings absent from his family, on the whole of the Continent, from Calais to St. Petersburg north, or to Palermo south, probably not more than one in five spends his evenings *at home*. You will agree with me that there is thus little chance of devotion to literary pursuits, or even to promoting the material, moral, and intellectual well-being of the lower classes, for which so many efforts are made in this town. But let us go a step further. Where and how are our young men, whether clerks

or merchants' sons, who are expected to be our future merchants, occupied in the evening, comparing them with similar classes abroad? I shall be glad to hear from Dr. Ginsburg, (and I regret his absence this evening,) that such organisations as the Philomathic Society, with its two hundred and fifty members, all, or nearly all, young men, the Chatham, the Young Men's Christian Association, and many other similar religious, literary, or scientific institutions existing in this town and its suburbs, are equally numerous and prosperous in Marseilles, Antwerp, Bremen, and Rotterdam, as they are in Liverpool.

More can scarcely be expected from our merchants, as their peculiar occupation is not favourable to their becoming authors or proficient in art and science themselves. All that is demanded from them is, to assist in supporting authors, artists, and such scientific projects and discoveries as will redound to the honour and advantage of the town or country. But we are at present even not altogether without mercantile authors in Liverpool. *The American Union*, by Mr. James Spence, is a work of considerable merit, and created a great sensation during the American struggle. Some portion of this work was objected and replied to by Mr. C. E. Rawlins, Jun. Both gentlemen are members of this Society. Our respected representative, Mr. S. R. Graves, published, not long ago, his *Excursion to Norway*, an interesting work. Recently, Mr. W. Rathbone, Jun., wrote a useful and able little volume on *Association in Benevolence*. Mr. George Melly is the author of *Khartoum and the White Nile*, as also of an amusing volume, *The School Days of a Fag*. Mr. W. W. Raffles contributed to our store of literature, his *Ascent of Mont Blanc*; and no doubt, were I to search, I might find many more merchant authors, who by the creations of their intellect do honour to this town. We may also view this matter still in another light. A merchant may be unable, amidst

the incessant turmoil and cares of mercantile life, to devote himself to literary and scientific pursuits; but to show his innate love of the same, he may urge and assist his son to embrace a learned pursuit as his profession. Have we not such instances in Liverpool, on which we may pride ourselves? I will only mention two, but there are doubtless many more. The first is the Master of St. John's College, Cambridge, Mr. Bateson, the son of the late Mr. Bateson, who was considered the father of the Cotton trade; and the second is one who combines in himself the scholar, the philosopher, the statesman, the financier, and the philanthropist; one who not only does honour to the town and country which own him as their son, but also adorns the manhood of the world; it is scarcely necessary for me to pronounce the name of the Right Hon. William Ewart Gladstone, the son of a Liverpool merchant.

I have too long detained you in vindicating the *intellectual* honour of the merchants of Liverpool in regard to literature, science and art. I wish I could vindicate in the same degree their *mercantile* honour and morality, of which, alas, we have had, for some time past, many instances to be ashamed of. I trust, however, that want of rectitude in mercantile transactions may gradually disappear, assisted by proper laws to punish fraud and misconduct. The great misfortune is that acts of this kind are not exposed as they ought to be, but are too often hushed up. An efficient check would also be given, and a just rebuke administered, if society were to discountenance the display made and the entertainments given by mercantile men whose commercial rectitude is of a doubtful character. We may commiserate misfortunes, but reckless and fraudulent over-trading, at all events, should meet with evident marks of social disapproval, and even abhorrence.

I must now return to the *Congress*. Although every

department had its salient points of interest, and warm debates took place on certain questions, the great battle was fought in the second section, that of *Popular Education*.

I must, however, make an observation before I proceed. My paper was written previous to our last meeting. Since then we have had a fortnight of educational agitation, consisting of—

Educational Conferences,

Educational *Conversazioni*s,

Educational Dinners, and

Educational Leaders in the Daily and Weekly Journals.

Hence any trifling merit or new suggestion there might have been in my communication fourteen days ago has now passed away, as the subject has been spun threadbare.

While I regret this in one point of view, on the other I rejoice to see that the opinions I have held, and expounded from time to time, although often dissented from, have since our last meeting been advocated by various leading statesmen and scholars of the day; nor have these thrown any new light on the subject, so that I see no cause to alter anything that I have written.

Education continues to be the great subject of the day, as it has been the perplexing one for the last forty years; but the rapidity with which society and its various interests hurry forward in these times brings the necessity of educating the masses more prominently and urgently before us; creating an all-absorbing anxiety, as it involves our national future, whether we are still to occupy the high position that we have done hitherto, politically, socially and commercially, or whether the assertion of Ledru Rollin, uttered some years ago, that our decadence had commenced, shall become a verity. If this is not the case, and Great Britain is still to stand prominent among the nations of Europe, then the

instruction of not only the lower, but also the middle and higher classes, must be much extended and improved. Institutions must rise up in our midst like the *Real- and Gewerbeschulen* in Germany, the *Lycées* and *Ecoles Polytechniques* in France; or our colleges and grammar schools must be transformed into such, and our universities must scatter their fruits and rewards among all classes and professions, independent of religious or sectarian differences.

The question which attracted greatest attention was: *Is the national or denominational system of education best suited to the circumstances of Ireland?*

So strong was the anxiety to be present at this discussion, that the audience had to adjourn from the large lecture hall in the college, to the Presbyterian church opposite. My object is not to follow the discussion on education as regards Ireland only, but where it is of equal importance to the whole of Great Britain.

For many years past, the zeal of religious sectarianism, manifested by both clergy and laymen of all denominations, has been a great obstacle to the progress of instruction, among the humbler class especially. It is painful to contemplate that, owing to religious scruples, however sincere, the very objects for which the sectarians strive are in a great measure defeated. Suppose we place the matter before them in this light:—

“You object to tuition in secular knowledge—nay, even religious knowledge, unless it is instilled in your own mode, and by yourself; hence, a large number of the working classes remain without instruction, as is amply proved by the Registrar General’s statement lately, that 28½ per cent. of all those who are married cannot read or write; and the criminal calendars show even a far higher per centage of ignorance. Now, what is the fact? Is religious knowledge spread by the dogged determination that two things must be

inculcated *together*, Elementary knowledge and Christian religion of a certain sectarian description?"

Reading, writing and arithmetic not only teach the mind its first steps, and quicken the latent powers of the intellect into conscious life, but they are also needed in our calling, to promote our success in the future, and to enable us to perform our duties as citizens. Reading *must* precede instruction in the contents of the Bible or Prayer Book; a plain indication which is to be taught first. The ignorance and irreligion of the masses must thus in part be attributed to the conscientious religionists, no matter to which church they belong.

True, sectarians have assisted in their own way to educate *some* of the population; but the good they have done has been in part counterbalanced by what has been left undone. Various projects, local and general, have from time to time been advocated, and been on the point of being carried, but for the opposition of one or other, if not of several, divisions of the Christian church. (We may trace the action of the same cause wherever education is most defective,—Spain, France, Austria, and Belgium,—where it results from the priesthood having had the monopoly of instruction. Whilst in Austria the education of the middle and higher classes is equally good as in Prussia, the elementary instruction, however, which till recently has been under the the management and control of the church, is very defective.) Had our people been instructed in the past on an improved and enlarged principle, we should not now occupy the humiliating position of being far behind the United States of America, Germany, Holland, &c.

Happily, we are convinced of the fact, and the knowledge of our deficiency is the first step to an amelioration. Lord Brougham read a paper on the diffusion of knowledge at

the Social Science Meeting, held in Liverpool in 1858. His remarks were pertinent, and very applicable to the subject. He asked, whether one eye and one leg were not better than none; and if twilight were objectionable, was utter darkness more desirable? Thus it is with secular and religious education; have both together, where it is preferred and possible, *or* have the secular and religious instruction divided, if more convenient or more adapted to the circumstances.

You will easily conceive that the numerous speakers in Belfast, comprising ministers and laymen of all denominations, and of the three kingdoms, besides some foreigners, had each his crotchet on this interesting and important subject.

After due attention and reflection on the plans and arguments of the various speakers, it appears to me that the system pursued in Holland is the one nearest calculated to suit this country. The Dutch system for the instruction of the lower classes has, after a trial of more than half a century, answered fully the expectation of its promoters. I may here state that I am not in favour of any uniform system of education, nor of compulsion being adopted in this country, beyond what is or may be exercised by the Factory Act and Poor Laws. As an Englishman, I admire thoroughly the voluntary efforts, the independent and varied systems already existing in this country, far more than the stereotyped, centralised principle on which the instruction of the masses in Prussia and other countries is based. I believe that even the different sorts of school-books in use, and the varied systems of tuition pursued, in the United Kingdom, act beneficially, producing a greater variety of impressions on the intellectual faculties, and are more advantageous to the nation as a whole.

In Holland, instruction to the working classes is not

rigidly uniform ; nor is it compulsory, except in special cases similar to our own ; nevertheless education has advanced in an equal ratio to that of Prussia and other German countries, Switzerland or America ; viz., as great a number of the population can read and write, and as large a per centage of children attend the schools, as in any of the countries just named.

The only existing compulsion is in cases where parents obtain relief ; then the municipality or state steps in to educate their children on the ground that care must be taken that hereafter these children shall be able to support themselves, and not become burdensome to the country. For each day they are absent from school, without sufficient reason, a day's allowance of relief is withheld.

The present system of popular education in Holland was founded in 1806 ; and although many changes have from time to time taken place, the original principle remains intact. Numerous efforts have been made during the last half century to introduce compulsion, but have been invariably rejected, as unsuitable to the habits of a free people. Religious battles have also been fought in the Dutch Parliament to upset the secular school, and institute religious instruction, but without success. In 1811, Cuvier was deputed by the Universities in France to enquire into popular education in Holland, Germany and Switzerland. He described, in his report, the emotion of astonishment and delight with which he was struck at his first entrance into these schools ; and he added that the primary education was above all praise. In 1836, Cousin visited Holland on a similar mission from the French government, and his opinion was equally favourable. In 1840, the Governor of the province of Groningen, as also the municipality of the city of Haarlem, reported that there were no children, in either the province or town, that could not read or write. In 1861, Mr. Matthew Arnold, in reviewing



the history and progress of popular instruction in Holland, thus expressed himself :—

“Such is in Holland the present excellent situation of primary instruction; nowhere, probably, has it such thorough soundness and solidity. It is impossible to regard it without admiration.”

The excellent system of inspection, and the practical and professional training of the teachers, followed by a rigid examination, have contributed mainly to this great success.

Some of the inspectors are men of private means, and act *con amore*, without remuneration. The inspectors constitute the board of education, and are in direct communication with the Referendary, who may be said to be the President, and is only second to the Minister of Home Affairs (Interior), with which ministry the educational department is united.

Although only secular instruction is given in the primary, as also in the middle and higher schools, the statutes require that the instruction shall be such as to train the recipients for the exercise of all social and Christian virtues. No special religious teaching is to be imparted, nor the Bible introduced in the schools. Once or twice a-week some hours are set apart, when the scholars are instructed in religion by their respective ministers, priests or pastors. Sunday schools are also in active operation in Holland.

The minister and schoolmaster assist each other in their endeavours to promote religious and secular instruction.

The eminent men, from whose reports I have quoted, all state that although the schools are secular, nowhere has the instruction been more eminently religious, and formed men more pious and moral.

Let me here ask you, Is the religious instruction given by a minister of religion not preferable to that of the schoolmaster, whose office is totally different and of whose princi-

ples we are so uncertain that they may be rationalistic or ritualistic?

The public schools in Holland are primary, middle, and higher; these are all under the control of the town and provincial councillors, in conjunction with inspectors. The school-fees in all cases are moderate. When they do not fully meet the expenses, the deficiency is met from the local rates, or, if necessary, by the government. Beyond these three classes of schools, there are gymnasia, agricultural schools and polytechnic schools, nearly all of which have evening courses for those who are occupied during the day, and are similarly supported.

The schoolmaster, although already examined and admitted to the profession, has, when applying for a vacancy, to undergo a competitive examination with other candidates; three or six are generally nominated by the town or provincial council. Besides the required general knowledge, mental culture, school-method and pedagogic aptitude are considered of the highest importance.

Private and special schools are also allowed, and there are many denominational schools connected with churches and religious communities, as in this country, in which doctrinal religion is taught; they receive, however, no aid from the local or general government, but are nevertheless subject to inspection and require certificated teachers.

The instruction in the primary schools consists of—

Reading,	Geography,
Writing,	History,
Arithmetic,	Singing,
Grammar,	Drawing and Gymnastics.

And for the more advanced youths—

Rudiments of Algebra,
„ Philology,
„ Natural History.

Whilst in the middle and higher schools, the instruction includes—

English,	Political Economy,
French,	Book-keeping,
German,	Physical Science,
Mathematics,	Mineralogy,
Mechanics and Geometry,	Rudiments of Botany and
Chemistry,	Zoology,
Technology,	&c., &c., &c.

Classics are only taught in the *gymnasias*,\* where the students are prepared for the university course.

Returning to the subject of compulsion at home, I see one great obstacle to carrying out the principle generally in this country. It would be difficult to recover a fine from a poor man, or to inflict some other punishment; nor would compulsion raise education in the eyes of the lower classes. During the past year not less than 758 fathers in Berlin were sentenced to imprisonment for not obeying the school laws in this respect, and 2,034 were fined. If such be the case in Berlin, where it is a religious duty to send children to school, and where it has been so long in vogue, we should surely have to commit ten times that number to prison—(the population of Berlin and Liverpool differs but little). Are we prepared to deprive 7,000 fathers of families of their liberty, and fine 20,000 more, or even half that number? Would such proceeding be tolerated? nay, would Parliament even pass such compulsory laws? Not many years ago, a commission was appointed, whose report, by a large majority, was against compulsory education, as unsuitable to this country. The system in force in Prussia, they said, was adapted to a different state of society from ours, where

\* The *Gymnasias* on the Continent are similar to the English Grammar Schools.

the central administration wielded greater power over the people, and where they were habituated to a more searching police. Mr. Sam. Laing, in his *Notes of a Traveller*, strongly deprecated the introduction of this system here. Many other eminent statesmen and scholars equally did so then, and do so now; nor have Frankfort, Hamburg and Geneva adopted the compulsory system, though no towns stand higher in the number of their schools and quality of instruction than these three. Mr. Matthew Arnold, in his book on *Popular Education in Switzerland*, states, that while in Geneva he was informed that the compulsion enforced in the neighbouring Cantons was quite illusory. In the Canton de Vallois the child needs to attend only during five months in the year; in the Canton de Fribourg, the law, though it embraces all between the ages of seven and sixteen, authorises the exemption of those children whose labour cannot be dispensed with by the parents; and similar relaxation is conceded in the Canton de Vaud. Mr. Arnold learnt that the Council of Public Instruction found the greatest difficulty in reconciling the requirements of the law with the consideration due to poor parents. While there had of late years been a steady increase in the population, the number of children attending school had diminished yearly, so that while in 1846 the attendance of 34,781 was registered, in 1852 the number had sunk to 32,853, and in 1858 to 30,438. Though the system of instruction was good, and the examination of teachers and inspection of schools carefully attended to, the results were unsatisfactory. And it was evident that, while in France, without compulsion, primary education was progressing, in Switzerland, with such aid, it was retrograding.

Nor are compulsion and good tuition the only means by which the attendance of children at school may be secured. I will suggest some :—

I. That no one be allowed to engage a servant, male or female, in town or country, in a factory or for domestic or agricultural purposes, without either a certificate that he or she has been for a certain period at school, or proof of ability to read and write; the forging of such certificate not only to be followed by instant dismissal, but also be liable to legal punishment.

II. That in voting for a member of Parliament, for a municipal councillor, commissioner of the local boards of health, vestry-man, churchwarden, all shall be done by bulletin—the voter writing the name of the candidate, signing his own, and delivering it himself. Forgery to be followed by disfranchisement independently of its being an offence punishable by law.

III. That parties applying to be married, either at the registrar's office or by any minister of religion, shall sign, *previous* to the ceremony, a request that they desire thus to be united, instead of signing the register afterwards; or, if necessary, both *before* and *after*.

IV. There is still another method to increase the attendance at school; *i. e.*, to levy school fees from all parents who are able to pay for their children between six and twelve years of age. This system has been adopted in three northern provinces of the Netherlands, Groningen, Overijssel and Drenthe, with the best result. Although these provinces have adopted this rule, the parliament has refused to pass such a law nationally.

I am aware that the three first restrictions (even if passed into laws) could not at once be acted upon, but some years must elapse in order that all might meanwhile receive sufficient instruction. These laws, however, becoming known, would induce not only parents to send their children to school, but even men and women of maturer age to devote themselves to attain the required knowledge, to meet the otherwise

important restrictions affecting their future privileges and welfare. Furthermore, all schoolmasters and schoolmistresses should be properly educated, and pass an examination, (in preference, by one of the Universities, or by a board of education, consisting of the school inspectors, as in Holland;) and without this examination none should be allowed to teach. The normal schools, for pupils who have shown adaptation in the common schools for this profession, would be, and are, I believe, already, an established mode to obtain an adequate number of candidates. The first requisite for improvement in any educational *system* is undoubtedly a superior class of teachers. These, however, ought also to be better remunerated than they have been hitherto, and to have a chance of promotion, with increased honours and emoluments.

In Holland, schoolmasters receive pensions after forty years' service, and also when sixty-five years of age; and are otherwise rewarded for good service.

Our government system of contributing, according to results ascertained by examination, appears to have thus far answered well; this principle should be applied to all schools whether denominational, national or secular; a sufficient number of secular schools to be provided by the municipal or other authorities, and the cost beyond what is received thus and from school fees, to be defrayed by government; but I doubt whether in large towns voluntary efforts would not provide the secular schools required. It is only in rural districts, thinly populated, that the authorities, local or general, would have to take the initiative.

The system (introduced already here and there) of alternate school-days deserves, for more than one reason, serious consideration :—

1. It would enable the children of the poor, who can be of service to their parents, to be so half the week.

2. It is now well understood that much benefit is derived from a change of occupation, both mentally and physically; I believe that thus a youth will probably learn as much in three alternate days as in six consecutive ones; and the three days of intellectual labour may also be more valuable in any industrial pursuit than that of an ignorant lout.

3. And lastly, half the expenses would be saved, as two hundred children would be instructed in a school capable of holding only a hundred, and thus masters, required to teach a hundred, would suffice for double that number.

In France, it is found that a greater proportion of the children attend school in the rural than in the urban districts; and although by a factory law, a certain number of hours should be devoted to instruction, this rule is extensively evaded. The general obedience to the law in Holland is possibly due to the fact that that country has few manufactures. Now the alternate day system compromises with the eagerness of parents to profit in manufacturing districts by their children's labour; while it is specially applicable to rural districts, where children are a considerable distance from school.

I have recently seen the proposition of Archdeacon Dennison, that the denominational schools should remain as they are now, without any change, but that secular schools be established in every town or district, and receive the same assistance, tested by results, as the denominational; while on the other hand, the Manchester Education Reform Association indicate the conscience-clause as the best and only remedy to attain the desired result of drawing children of every sect to school.

I say, adopt both schemes; act on the wider basis; let the conscience clause be introduced in all denominational schools, and establish also secular schools. It is my conviction, that then we should soon realise what is

so ardently desired and indispensable, viz., *the education of the masses*.

But before I leave elementary instruction of the working classes, I must say a few words on the subjects to be taught.—Now, the notion that a little reading, writing and calculation, with the Bible is sufficient for the artisan, has, in a great measure, disappeared. It is a fallacy to be buried with many others of our former principles and ideas. The artisans of other countries receive superior instruction, and consequently will surpass ours in taste and ability as workmen; and as we also pay much higher wages, we shall eventually be left behind in the race, unless we educate our men,—aye, and women also to an equal standard. Already symptoms of our inability to compete are here and there painfully apparent.

The importance of this point is illustrated and confirmed by Messrs. Minton & Co., and others, who say that since schools of design were established, they, as well as their workmen, have availed themselves and greatly benefited by the advantages thus placed within their reach.

We have elevated our men also politically. Hence for one reason or other the instruction of the lower classes must be enlarged, and include the elements of geography, national history, physical and social science, plain ideas of political economy, drawing, all in a simple manner, easily to be understood; so that with further education received afterwards from the admirable free-press of this country, they may be able to understand their own interest and that of their native country, and not be led astray, through ignorance, by the various snares laid on their path, as the evil of strikes, the excesses of trades-unions, &c.

A Belgian speaker, at the Social Science Congress.



Meeting in Ghent, recommended the writing and publication of a popular encyclopædia; or a national dictionary for the lower classes and artisans, *to contain all the practical knowledge a workman ought to possess, and worthy of the liberty he enjoys*; in fact, a code of the civilised citizen. Such a book, sanctioned by public spirit or the popular voice, would serve not only at the schools, but at the family fireside, and should rank next to the Bible and catechism. He suggested that government should offer a prize for such a complete work; and he believed that no amount they might pay, would be too dear.

It also appears very desirable that in such a country as this, possessed of numerous colonies, and yearly sending forth large numbers of its children to settle there, a thorough knowledge of the climate, resources, &c., of our various dependencies should be inculcated at all our schools; but especially at those where the classes from which our emigrants are chiefly drawn receive instruction.

It might also be wise, in our reformatories and our pauper and ragged schools, to encourage the youths to select for their future career, say the army, the navy, or emigration, and thereupon to impart such information as should make the subsequent life thus selected one of success and rectitude.

I have so long detained you with the instruction of the lower classes, that I must hurry on and even curtail my observations about those higher in the scale of society. This is, however, less material; as these, when once thoroughly informed of their present defects, are in a better position to apply a remedy.

Not only is the education of the so-called higher and middle-strata of society insufficient, but the very progress contemplated in this respect for the lower classes will make

a concurrent advance doubly essential to those above them. I alluded to the rudiments of political economy, physical science, &c., as being required to be taught in our common schools. These are to a greater extent necessary in the middle higher schools; and natural philosophy, modern languages, general history, and mathematics should also be added, as most desirable for those who are about to devote themselves to commerce and industrial pursuits. In fact the Dutch programme may serve as a model. The predominance of classics in the commercial daily or boarding-school, has often been discussed in this and other learned societies, and by public speakers. Many of the rectors of our and the Scottish universities have alluded to it in their inaugural addresses. Now although many of these *savants* may under all circumstances be in its favour, I venture to differ from them, on the ground that for those youths who have to end their school-days at the age of fifteen, in order to apply themselves to their future callings, there is not sufficient time to learn all that is essentially necessary, if much time is taken up with the classics. The great commercial intercourse between the various European nations, the ever increasing ease and rapidity of communication, the importance of continental literature, all combine to reverse the conditions of social victory in the days of our grandfathers, when the continent was closed to Englishmen, and a knowledge of French was almost equal to a proof of disloyalty. A knowledge of modern languages is now essential to a business man or to a gentleman, and overrides the claims of Latin and Greek. Let it be well understood, those who can remain at school till eighteen or twenty should by all means first receive instruction in the *dead* languages, to be followed by the *modern* ones. What has been the case in the past? Three-fourths of the week have been consumed in the study of Latin, or Latin and Greek, much to the neglect

of other and indispensable branches of tuition. But then two arguments are generally produced in their favour, viz., that the modern or living languages are more easily attained through the knowledge of the ancient or dead ones, and that Latin is the root of all grammar. And furthermore, it is affirmed that the study of the classics is an excellent mental training.

I would reply to these two arguments, that not one out of twenty young men or women, who have spent a considerable part of their school-time in the study of Latin and Greek, knows much of these languages when leaving school, or has had time to acquire French or German or any other foreign tongue. Even the examinations for the diplomatic and civil services have often proved the candidates very ignorant of English itself; and as to the effect of mental training, it is thought by many that mathematics, geometry and algebra are more calculated to strengthen the intellectual faculties, to produce correct and logical reasoning, and more likely to benefit the future merchant, manufacturer, engineer, ship-builder, architect, and members of similar professions or industrial undertakings, than the classics. In no country in Europe is so much Latin and Greek taught in the middle class schools as in England, although in many countries foreign languages are far better understood than in our own.

As an instrument of mental discipline, physical science appears very desirable and important; while natural and experimental philosophy are valuable both as a study and a recreation.

Our former president, Dr. Ihne, says:—

The organisation of the *real-schule* for middle classes in Germany, is analogous to that of the gymnasia; they have annual courses, and a gradually ascending scale of tasks; in short they only differ from their elder sisters, the

Gymnasia in this, that they substitute modern languages for the ancient, and extend the course of natural sciences. This, as you have heard, is also the case in Holland.

I had written thus far, when the letter on technical education by Mr. Samuelson, M. P. for Banbury, was sent me by that gentleman. It is the result of a continental tour of inspection or investigation of schools and factories, and has been addressed to Lord Montague, Vice President of the Board of Education.

This document affords much information in a small compass. The descriptions of the peculiar schools and colleges in France, Germany and Switzerland cannot fail to interest us deeply at this moment, and to supply us with the fundamental principles on which a liberal education should be based, as applicable to the future industrial and scientific pursuits of the scholar.

Mr. Samuelson remarks, that in the establishment of central schools or colleges in France, special attention is paid to the town or district in which the institution is placed. In Mulhouse and Rouen, (the Manchesters of France,) and in Lyons and St. Etienne, (the Spitalfields of France,) not only art is taught, but also chemistry, applicable to dyeing and printing. In colleges situated in the centre of rural populations, a course of chemistry for agricultural purposes specially is pursued, such as analysis of soils and manures, whilst instruction in navigation is given in the schools of large seaports; and metallurgy in those of mining districts.

This system of instruction is in some measure even followed with the humble elementary scholar, although in a minor degree; and as the French soldier is said to have a marshal's baton in his knapsack, so has every French scholar, however humble, a valuable prize in his satchel. A greater number and variety of *bourses* and scholarships are given in France, and elsewhere on the continent, than has been the

case in this country hitherto; they include residence and instruction at the Lycée, school of art, or Ecole Polytechnique.

Such of you as may have been in Rome will remember one of the most prominent palaces or buildings, the Villa de Medici, situated near the promenade or drive, as being the French academy of fine arts, entirely maintained at the expense of the French government, and under the supervision of their ambassador, where deserving art students are gratuitously educated. Our own wealthy corporation could not expend a few thousand pounds annually more usefully than in stimulating rising talent, by offering to the youth of this town scholarships to higher schools or scientific institutions.

I may just supplement Mr. Samuelson's able review, by calling your attention to our inferiority in certain departments of industrial art, and our inability to compete with our continental rivals, either in workmanship or in prices. The painting or staining of glass in Belgium or Germany is not only infinitely superior to our own, but also much cheaper. A splendid memorial window in Crosby church, recently supplied by a celebrated firm in Brussels, well deserves a visit from those who are lovers of that ancient art. Carving in marble or ornamental sculpture is carried on to such an extent in Belgium, that this country is for the greater part supplied with sculpture and artistic chimney-pieces from thence, although the statuary marble for this purpose is mostly imported into Belgium from Italy. It has also often grieved me to see that England does not participate in the large and lucrative trade of bronzes, so prosperous in France and Germany. With the exception of Elkington & Co., who now and then display a group, no attempt is even made to introduce this charming art-industry to us.

The urgent necessity of increased and improved education for every class of society, profession, and occupation, was

admitted at Belfast without a dissentient voice, and I am sure will be equally so by the Liverpool Literary and Philosophical Society.

The Chambers of Commerce abroad take a lively interest and active steps to promote technical education. I have observed that the Associated Chambers in Birmingham have given it their attention ; and I trust the zealous members of the Liverpool Chamber will not fail to take this important matter into their consideration.

I have, Mr. President, ladies, and gentlemen, occupied your attention already too long, so will conclude with a few observations on FEMALE EDUCATION.

Let me remark that here again the Social Science Association is doing good service by keeping alive an important subject. I have in vain sought amidst the mass of speeches in parliament, and from members in their orations to their constituents, for a slight recognition of the necessity for enlarged and improved female education.

Provision is made to educate men ; the State interferes substantially in both elementary and higher instruction. Before the Reformation, endowments existed in behalf of female education ; but as they were closely interwoven with religious houses, they were after that event transferred for the benefit of men, and the education of women remained unheeded by the State. The idea formerly prevailed, that women should not be educated to an equal standard with men. But I imagine that it is as essential that the judgment of the other sex be formed, the character disciplined, and the understanding cultivated, as in men. The mind has properly *no sex*.

I have not found, nor do I believe, that women who are distinguished by great talent and high mental culture have failed in the performance of the duties of their sex ; nay,

the more woman is instructed the better will she be able to answer to the high destiny which a wise Providence has imposed on her. Women may safely say, "The future belongs to us." *They* lay the first foundation as mothers, for the weal or woe of those men and women who will become the good or bad citizens of the next and future generations.

Besides, statistics furnish us with the fact, that more than one million of women in this country must remain unmarried; and they should be specially considered, and provided with such instruction, that in their solitary pilgrimage they may steer through life unscathed by the many difficulties and dangers which surround them.

The quality and measure of education required for the various social divisions next claim our attention. As I said before, I hold that the education of each class of women ought to be fully equal to that of men of similar position; to which should be added such peculiar instruction as may be useful and necessary to the future wife and mother.

Such is hygiene, or the outlines of sanitary knowledge, which is much required among the poor especially; and the want of which is one of the causes why the death-rate among children of the lower classes is so fearfully high.

Another reason why the education of women should be much more extended than it has been hitherto, is the necessity that a greater variety of employments be thrown open to them to provide for themselves if unmarried, or if called upon under special circumstances to assist and earn a livelihood for their families. There are many such employments not yet developed in this and other countries. In Chaux-de-fonds and Locle, in Switzerland, prosperity is found everywhere in a high degree; but there all women, married and unmarried, are employed in making watches and musical boxes; while in the

same country, there are thousands and tens of thousands, through whom the great and profitable branch of industry of worked muslins, ladies' handkerchiefs, and other embroidery is carried on. In Belgium, there are, again, many thousands employed in binding books and other stationery work. (A printing-press—the "Victoria"—worked chiefly, if not entirely by females, has for some years past been in operation in London.) Porcelain painting and other art-branches occupy a great number in France and Germany. There are numerous other industrial occupations which the capacity, intelligence, and good taste of women are well calculated to enter upon. The industrial society of Mulhouse has resolved to open to women new sources of labour.

It is perhaps not generally known, that in Paris, and other parts of France, the wives and often the daughters of the higher classes take an active and leading part in conducting the business in large commercial establishments, and, I can say from personal experience, with great credit and advantage to themselves. Their acuteness is proverbial, their judgment calm, and generally just. In application and perseverance, they even surpass their stronger helpmates. The origin of this custom is to be found during the reign of Napoleon I., when nearly all men between eighteen and fifty had to fight the numerous battles of the Empire; and women were thus compelled to assist in the field, the factory, and the counting-house.

I was much pleased to see many intellectual-looking young women, clean and neatly dressed, occupied in the wholesale Belfast warehouses of Messrs. Duncan Dunbar & Co., and other firms.

Next, as to superior female education, I find that opinions generally tend to prefer the influence of home-life, with a college or school discipline, for the girls of the middle and higher classes. At the Social Science meetings in Belgium and



Holland, this system was ably advocated, and among others by ladies of high position and great intelligence; and continental nations are acting on that principle. Institutions and colleges, with eminent professors, are gradually taking the place of boarding-schools; in which latter it is considered showy accomplishments are mainly taught, in preference to the more solid part of instruction, which ought to include the higher branches of science and literature.

In Geneva, Stuttgard, and other towns, colleges of this description exist. To the Sorbonne in Paris there has lately been added a high school or university for women, and young ladies of the first families avail themselves of this instruction. We have in our country even greater reasons for substituting such colleges for boarding-schools, as the ladies who conduct these latter establishments often do so from necessity, being widows, wives, or daughters, in order to provide for themselves or families, without possessing adequate talent to fulfil such important functions. However much benevolence and charity may approve of and wish success to such efforts, the education of the daughters of England is of greater importance *even* than the support of a certain number of ladies or families. In America also there are numerous institutions and colleges for teaching the higher branches of knowledge to woman, and these are prosperous.

If ladies are to remain instructors of their sex, they should be educated for that purpose, and give proof that they possess the necessary ability. Institutions to prepare female teachers and governesses exist here and there already on the continent; London and Cambridge universities do now examine and grant degrees to women; but universities or high-schools, where teaching and examination are combined, would be preferable. There is one difficulty in carrying out the system of town colleges for ladies, which I must fairly state, viz., that wealthier families in this country

reside, not in the town, but in the suburbs ; thus the inconvenience and other objections to go and return daily to the neighbouring town or city are an obstacle.

There are other reasons for giving the preference to colleges over boarding-schools. Whilst the discipline of public schools does not permit of any parental interference, the heads of boarding-schools are constantly interfered with by parents in the management of their pupils.

Two colleges for young ladies, where university professors give instruction, do now exist in London, the Bedford, which I understand, is on the secular principle, and the Queen's, in connexion with the church of England ; and I have heard them highly eulogised for the course of instruction imparted there, and for the ability of their professors.

I hope the subject of female education, both lower and higher, will receive that further attention which its importance so well deserves.

I would gladly have touched on some other interesting subjects in connexion with Social Science, but we constantly find ourselves unable to accomplish what we aim at or desire, and we are therefore compelled to place a limit to our labours. Let us, however, while we have life and health, use our faculties to promote the good, the true, and the beautiful ; let us not accept the motto, "Rest and be thankful ;" let our watchword rather be, "Onward, onward." May we endeavour by our exertions to ennoble humanity, and thus to glorify the God of humanity. There remains much work to be done for our country's good ; scarcely is one effort accomplished, one difficulty removed, one victory gained, before numerous new questions press for solution.

Electricity appears to preside over all our movements ; incessant activity is thus required. In England, every freeman, member of the body-politic, should enter the arena

of strife as if the welfare and progress of his country depended on his individual exertions.

Do not believe that our decadence has commenced ; but be assured, if we run the race vigorously, the prize will still be ours ; and this gem of the ocean, this empire on which the sun never sets, will continue to be a guiding star to other nations in the path of political liberty, of intellectual progress, and of religious freedom.

Since this paper was delivered, the Author has visited Holland, where he inspected some of the primary, middle and higher schools. What he there saw impressed him still more favourably with the extent and quality of the instruction imparted.

The Utrecht Higher School appeared especially worthy of praise.

Though the class of schools which this represents were directed to be established but a few years since (in 1863), already thirty-two are in full operation, and seven others are being erected. It is intended to form one in every town with 10,000 inhabitants or more, and in every district where, though no single town has that population, the various villages united have. Thirty-six towns in Holland come up to the requisite standard. The country districts may be represented by Sappemeer, Hoogezand, and Martenshoek (in the province of Groningen), where 15,000 persons are congregated around the institution, or by Zaandam and Zaandijk.\*

At Utrecht, a city containing 56,000 inhabitants, with an university, the high-school has been in operation only two years ; yet it is regarded with much public favour, and its class-rooms are filled with intelligent and earnest pupils. The writer cannot sufficiently express the feelings which animated him as he examined this building, the extent and loftiness of its class and lecture-rooms, its well-furnished laboratory, and the ample collection of engravings and models in the apartments where engineering and mechanics are taught. Nor was he less gratified by the influence exerted and the popularity of the fourteen heads of departments, who, under the direction of the President, impart the varied knowledge which is there supplied. Each head of a department (*docent*) receives 2,500 florins (about £210 sterling) annually. This, however, is not the whole of their income, for, the school hours being

\* Of the thirty-two, twelve are supported by Government, the remainder by the municipalities aided by Government subsidies. Utrecht alone last year cost the Government no less than 80,000 florins, or £2,500 sterling.

very short, most of them increase it by giving extra lessons, either to their own scholars or to the students at the university. It is also usual for them to take boarders.

The course at the high schools extends over three years in some, and five years in others. In the smaller towns instruction is completed in three years. At Utrecht, students may remain either three or five.

Each pupil pays from £3 10s. to £5 per annum in the larger towns. In the smaller ones, however, the school fee commences as low as £2.

Classics are not taught, but English, French and German take prominent positions, a knowledge of the literature as well as of the language being carefully imparted. In fact, these institutions may be placed in the same rank with the *Real- and Gewerbe- Schulen* in Germany, and also with those institutions in France which have been described as adapting their course of tuition to the localities in which they are placed, sciences bearing on commerce and manufactures being specially taught in large towns, and in agricultural districts such other knowledge as is peculiarly useful there.

As the increase of population is constantly bringing other towns up to the standard at which a high-school must be built, the number will steadily rise year by year.

At the close of 1867, there were in these thirty-two schools three hundred and fifty-one heads of departments (head masters), of whom two hundred and seventy-three had before their appointment shown great ability and aptitude at the gymnasia, military academies, and other superior educational establishments, whence they came. Of the remainder, who were teachers of knowledge not included in the curriculum at those places, such as Political Economy, the talents and learning were undoubted, as will be seen from the fact that of the twenty-three who taught that science, twenty-two held the degree of Doctor of Jurisprudence.

As there are no high-schools in places where the population is below ten thousand, the middle schools there have an extra class for the impartation of knowledge more advanced than that usually furnished.

For instruction in the classics, there were sixty colleges and schools (known on the continent as "gymnasia"), the greater number of which receive subsidies from Government.

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This paper gave rise to a lengthened discussion, which it was unanimously resolved to continue at the next meeting.

## EIGHTH ORDINARY MEETING.

ROYAL INSTITUTION, 10th February, 1868.

J. BIRKBECK NEVINS, M.D., VICE-PRESIDENT,  
in the Chair.

Ladies were invited to attend this meeting.

The Rev. J. Holding, M.A., F.R.G.S., was unanimously elected a Corresponding Member.

Mr. Moore exhibited a selection of specimens from a collection made on a recent voyage to the China seas, by Captain Fred. E. Baker, ship *Nippon*, an associate of the society, and the whole of which had been presented by him to the Free Public Museum.

Among the objects exhibited were some fine Siluroid fish (generally known as cat fish), some bright-coloured fish, less than two inches in length, and commonly known as "fighting fish," from their extreme pugnacity, fighting at each other, or endeavouring to do so, even when placed in separate but contiguous glasses of water; also a giant species of prawn, measuring some two feet in total length, and having the pair of limbs bearing the pincers coloured blue. These, with many other specimens contained in the collection, were from Saigon River.

Among the objects caught at sea were specimens of minute Crustaceans, which were met with in such prodigious numbers, in lat. 38 37 S., lon. 32 E., as to give the surface of the sea a blood-red colour in every direction; also some crabs found with the janthinx or violet shells, which, like the janthinx, are invariably of a blue colour;

crabs found on floating timber, also approximating in colour to the material on which they are met with. Some Sallee men (*Verella*) of extraordinary size, and numerous other specimens, were also shown.

Mrs. Baker, who accompanied her husband, had shared with him the pleasant labour of making the collection, which was duly accompanied by notes of lat. and lon., and observations of interest on the specimens caught. Mr. Moore remarked further, that the pleasure derived from such pursuits during the tedium of a long voyage extends to the crew, who, although at first they may be inclined to vote a towing net or dredge to be a trouble or a nuisance, soon learn to take an intelligent interest in the interesting objects obtained therewith.

The CHAIRMAN then alluded to the death of Mr. Rathbone, and called upon

The Rev. H. H. HIGGINS, who said that he was glad to show, on behalf of the Society, any tribute of respect to the late Mr. Rathbone. His name and life had been so prominently brought before the public in the local press, that he would on this occasion refer only to his connection with this Society and the Royal Institution.

Mr. Rathbone was one of the original founders of the Literary and Philosophical Society; and now that he was gone, there was only one left — Mr. Holbrook Smith. Mr. Rathbone had often spoken to him (Mr. Higgins) of the delightful associations of those early times, when the members of the Society frequently met in each other's houses, and, after spending the evening in literary and scientific discourse, concluded with oysters and porter. He had lately seen a list of the projectors of this institution in which they were now assembled; it was dated 1814, and contained thirty-six names. Mr. Rathbone had been the only survivor left of this list, which had a closer connection

with the Literary and Philosophical Society than with any other societies in the town. •

Mr. Rathbone had remained an active member of the Royal Institution for a long time; and after some retirement, he renewed this active interest in its affairs about ten years ago, when he became a member of the committee and continued in office to the day of his death. Mr. Higgins then referred to the funeral, at which he was present, and said that he had never seen in Liverpool such a number of influential men, and of such high standing, gathered together. He concluded by moving the following resolution, which was seconded by Mr. Richard Johnson, and unanimously carried:—

“That the Literary and Philosophical Society desire to record the deep concern with which they regard the loss from amongst them of Mr. William Rathbone, a true friend to intellectual improvement, and one of the original founders of the Society; and to express their heartfelt sympathy with his family on the mournful occasion.”

The adjourned discussion on Mr. Baruchson's paper was then resumed by Mr. Picton, Mr. Baruchson having first read some observations in reply to the remarks made at the last meeting. The points chiefly under debate were compulsory education; the value of the classics *versus* modern languages in education; and the patronage accorded to literature, science, and art in Liverpool. •

## NINTH ORDINARY MEETING.

ROYAL INSTITUTION, 24th FEBRUARY, 1868.

The REV. H. H. HIGGINS, M.A., VICE-PRESIDENT,  
in the Chair.

Messrs. Lewis Hughes, Charles W. Jones, John Marsh, and John Elliott, were unanimously elected Ordinary Members.

An unusual number of members and friends, including ladies, were present at this meeting, as it had been announced that Dr. Collingwood, late Honorary Secretary of this Society, would give an account of his recent scientific voyage to the China Seas. The address, which was delivered *extempore*, described more particularly "*The Physical and Ethnological Features of the Island of Formosa*," and was illustrated by a variety of maps and sections, and an extensive series of landscape drawings by the author, illustrative as well of the geological features as of the picturesque beauties in the scenery of Formosa.

Dr. Collingwood has since published a full account of his voyage, under the title of "*Rambles of a Naturalist on the Shores and Waters of the China Sea*." The work was exhibited to the Society by Mr. F. Archer, at the Eleventh Ordinary Meeting.



## TENTH ORDINARY MEETING.

ROYAL INSTITUTION, 9th MARCH, 1868.

J. A. PICTON, Esq., F.S.A., VICE-PRESIDENT,  
in the Chair.

Ladies were again invited to attend this meeting.

Captain Sir James Anderson, Associate of the Society, was unanimously elected an Honorary Member, and Mr. James Holme, Jun., an Ordinary Member.

A paper was read "On the Rationality of the Lower Animals," by Mr. W. Bromham.

## ELEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, 23rd MARCH, 1868.

J. A. PICTON, Esq., F.S.A., VICE-PRESIDENT,  
in the Chair.

Mr. Wm. Dixon was unanimously elected an Ordinary Member, and Captain David Scott, an Associate of the Society.

Mr. T. J. MOORE brought before the Society the following objects:—A vertebra and samples of Baleen of the Stape-rayder, or Rorqual, forming part of a donation to the Free Museum lately made by Mr. H. Bird, and introduced to the meeting that gentleman and Captain Bottemanne, of Leyden, both of whom communicated various observations made on this species on the coast of Iceland, where these whales are

abundant, and where one was measured 105 feet in length. Also a collection of butterflies from the Cameroons, presented to the Free Museum by the Rev. Quintin W. Thomson, who collected them during several years' residence as a missionary in that region of West Africa. Also the head of a large fish, apparently belonging to the Maigres (family *Sciaenidae*), taken off the Cape of Good Hope by Captain Fletcher, ship Sumatra, by whom it had been presented. Also the under jaw of a fish from the River Plate, presented to the Museum by Captain Batty, per Mr. R. J. Keen. The two sides of this jaw are united at the chin by a hinge joint, of very remarkable and beautiful construction. It belongs to a fish called the Dorál at the River Plate, and on being compared with a jaw of the *Sudis gigas* of the Amazon river seemed to be identical with that species, which attains to a large size, being one of the largest fresh-water species in existence. Also a very fine lacquered bowl from Japan, beautifully ornamented with figures of fishes in gold relief on a vermilion ground, the figures being drawn with great skill and truthfulness to nature, The bowl had been kindly lent for exhibition by Mr. Cross, of Park-lane.

The following Paper was then read:—

## ON CERTAIN THEOSOPHIC IDEAS OF THE EAST.

BY THE REV. W. KENNEDY MOORE.

IN every development of humanity, we must take into account the two related elements of the inward and the outward, what man brings in him and what he finds without him. In an individual life, we have a series of activities which are the resultant of these two things, the original germ of character and the circumstances through which it has been developed. When Themistocles was told by a Seriphian that he was only a great man because of the city he belonged to, he retorted, both wittily and truly, that his reproacher would not have been a great man though he had been born at Athens, nor would he himself have been great had it been his misfortune to be born at Seriphos. Two men differing originally would not live the same life because placed in the same circumstances, nor would the life of a certain man be the same had his circumstances been different.

Our character is not a simple effluence, like the springing of a fountain, much less a simple moulding, like the casting of a bronze statue. It is a development from within, modified by the pressure of external forces. The series of past deeds, constituting our historic life, marks the steps by which we have come from the original germ to the present phase of our being. Those deeds themselves have a power in determining to some extent those that follow. Our acts form an incrustation, so to speak, which confines an absolute freedom, just as each successive incre-

ment to the shell of a mollusc fixes more rigidly the direction of its growth.

These thoughts apply equally to races as to individuals. Humanity at large is a unit, the development of which forms all past history, written or unrecorded ; and the present character of which as a whole has been determined by that past history. That history shows how the nature we have has been drawn out and acted on by the whole system of forces, natural or supernatural, to which it has been subjected. What humanity is capable of in the developments of the future, whether as a race on earth, or in the individual being in some other world, it is utterly impossible for us to say, for we only know ourselves in so far as we have already developed. What powers yet unfolded may lie hid in the depths of our nature, we know no more than a caterpillar, feeding on a rotting leaf, contemplates the future glory of its purple wings, or than a drop of water is conscious of the tremendous electric forces that slumber within it.

A particular tribe of men give us a form of humanity more specialised than the race at large, but of course much less specialised than the individual man ; and with the needful modifications, all that we have said applies also here. The Anglo-Saxons would not have developed into Englishmen had they settled in Italy ; nor would the inhabitants of this island have been what they are, had they derived their origin from a Finnish Stock.

A particular application of the general truth set forth above, may be made in reference to intellectual products. In a work of genius, we note the shaping mind and the materials it found whereon to work. No other man but Shakespere had the peculiar power which enabled him to write King Henry IV. But he would never have written it had not English history furnished Bolingbroke, Hotspur and Prince Harry, and had not English social life given him the

elements of Falstaff and Dame Quickly. In a work of genius, it is as impossible to separate the subjective from the objective, as to separate soul and body in the living man. The whole intellectual life of humanity is the effort to see what actually is, and to set it forth when we have seen it. Works of fact, of philosophy, or of imagination, have no value except as they set forth truth. Poetry aims at speaking truth quite as much as history, only it is a different truth, a truth of finer sort. A statue or painting must express artistic truth. To devise an image, or recount a tale, signifying nothing, is to be an idiot or a fool. Although the true, the beautiful, and the good are properly enough made the terms of a threefold division, yet from another point of view they may all be included under the true. Humanity finds itself in a universe, and to find out the facts of that universe is the great task for the mind of humanity.

By far the most important part of this enquiry is the religious part. Physical science in its widest sense, including the investigation of mechanical, chemical and vital forces and beings, forms one great division of intellectual labour. Then we have the human sciences, such as law, politics, sociology, &c. The remaining division has to do with man's relation to the Infinite; and this we may in general speak of as religion.

There is an intellectual side of religion, and a practical side. Intellectually, it is the effort to see the actual state of facts regarding the Infinite and the relation in which we stand towards the Infinite; practically, it lays down rules for our guidance in life, based upon those facts with which we have become acquainted. In tracing the progress of our knowledge from its earliest germs, we may affirm that the foundation of all our knowledge is intuitional or instinctive. We thus know that we exist, and that external things exist, such as the ground we tread on, and the sun that warms us.

We do not need to be taught how to use our limbs or our eyes, that we should eat food and drink water, or that we should love our kindred, &c. All these things we know before we come to think of knowledge. As we proceed, our observations are easy and sure in those things that lie nearest us, but discovery becomes more difficult as we prosecute our researches into regions more remote, till at the present stage of scientific enquiry it requires great culture, care, and mental power to make any new discovery at all. A great deal of scientific progress depends on the formation of proper theories to explain facts, as the expression commonly runs. What is really meant is the discovery of the actual state of facts, from the appearances or observed phenomena. Thus the Newtonian theory of the heavens is the actual state of facts regarding the celestial bodies; while previous astronomical theories were right concerning the principal phenomena, but wrong in their conception of the actual state of facts by which these phenomena were produced.

To apply these thoughts to the subject of religion, we first assume, what no true philosopher or sane man will deny, that there is an actual state of facts regarding the Infinite, and the relation of man to the Infinite. Then we have to consider how far men have become acquainted with those actualities. What are the efforts they have made to see those highest truths, and to what extent have those efforts been successful, as far as we can judge?

Let us first consider what the Christian theory is in this matter. That theory may be thus concisely stated. The Infinite is a distinct personality, with individual will and morally perfect attributes, the author of all Finite being. More specially he has had a historic dealing with the human race, going on from the dawn of our being, through a series of events which culminated in the life and death of Christ, but which in some sense still continues. In this

series of events we have the fullest representation of his character, and the solution of the problem of the place and destiny of the human race. In this supernatural series of events, is included the giving of the writings in which the record and explanation of these events are contained; and no explanation on any of these points is to be admitted which is inconsistent with those records, or with the events of which they treat. An enormous amount of intellectual force has been expended in Christian countries in the elucidation of these records, and a full explanation of the principles that rule in the recorded events; and this whole field of thoughtful toil is generally described under the title of Theology. Other dealing with some of the questions that concern our relation to the Infinite, not taking historic records into account, we call more strictly Philosophy. We may venture to believe that in the future Philosophy and Theology will be brought into fuller harmony and closer alliance than they have been in the past.

Other systems of religion besides the Christian have claimed divine inspiration for their sacred books, as the Mahomedan faith for the Koran, and Hinduism for its Vedas, Puranas and Shasters. It is not our business at present to enter into any consideration of these contending claims to inspiration. We may notice that all religions, with very few exceptions, believe in some form of supernatural revelation; and where this is not looked on as contained in an inspired volume, it is held to come through a special class of men who are visited with a divine afflatus, and thus become channels of communication from the Deity. For our present purpose we shall only assume that in all religions there is a germ, however small, of truth. This at least there must be, that there is something divine, which men are bound to know and worship. It matters not to our argument whether such elements of primitive truth be supposed to be drawn

from intuition, from tradition, or from both sources. The various creeds which have grown out of this germinal idea, may for our purpose be looked on from the human side, as theories by which men have endeavoured to comprehend more fully the whole of the great facts with which religion has to do. In Oriental countries, and particularly in India, where the genius of the people is subtle, meditative, and high-soaring, these religious theories have been numerous and philosophic; and it is to these speculations that we give the name of Theosophy. It is in great part what we should call philosophy, but mixed up with religious formulas and claiming sacred authority. We cannot go over the whole field, nor even indicate its extent, but wish to call attention to two or three peculiar ideas which are therein found.

We may remark that the first form of any faith is simple and concrete. Personal spirits are believed in, who are looked on as the direct givers of the blessings of life, or the authors of the common evils from which men suffer. It has been said that man himself is a god to his dog. That faithful creature recognises in his master a superior being, who gives him all he enjoys, who has the power to punish him, whom he is bound to obey implicitly, and for whom he feels a strong attachment. It might almost seem as if some ruder tribes have scarcely any greater religious ideas than these. They believe in an unseen spirit who inhabits as his body, or rather his house, a certain idol, who makes their cocoa nuts to grow, or destroys their fishing-boats with a storm. It seems hardly possible, however, not to believe that, even in these dark dull minds, there is still some obscure conception of an Infinite Being and a future life. These ideas seem natural to the mind, and involved, however dimly, in all religion. In regard to Hinduism, the earliest sacred books, the Vedas, signalise the time of a comparatively simple and more concrete faith, the gods who are celebrated being



apparently elemental deities, such as the Sun god. The Theosophic element was more abundantly developed at a subsequent and more speculative period. The later sacred books of the Hindus are very numerous, and very voluminous, a good deal of them being taken up with mere mythology, tales of the amours and battles of gods, heroes and demons. A considerable space is also occupied with minute details of religious rites and ceremonies. Another portion is of the speculative cast; and it is with these we have now to do. As philosophers among ourselves do not agree, but Kant and Schelling, Fichte and Hegel, Berkeley and Hamilton have their diverse theories and separate schools of followers, so has it been in the East. The sacred books of Hinduism no more agree with each other than the learned and lofty treatises of transcendental Germany. To expound all the systems which Hindu sages have taught, would require a combination of leisure, learning, and mental power, which I have not at command. Still there seem to be some salient and prevailing points scattered throughout these systems which it may be interesting to notice.

Let us first take up those metaphysical puzzles, Space and Time. It has been held in Europe, you are aware, by certain philosophers, that these are two essential attributes inherent in the Divine Being. It has been also taught by other thinkers that they are nothing but forms of thought; that is, that we can't think of anything as existing or occurring except under the conditions of space and time. It has been further held by some, that space and time have been created by God, just as the material universe has been created which exists in them. This last hypothesis I must confess is one I can't properly understand; but it is somewhat akin to a Hindu idea on the subject. According to this idea, space is an original element of bodies ranking with the other elements of

fire, air, earth and water. When this whole universe, yet undeveloped, was contained within the limits of the primal germinal point, which was the seed from which all things issued forth, all space was also enclosed within that point, and outside of it was neither existence nor extension.

Such is the theory put forth, and which seems simply unintelligible to men of obtuser European intellect. This idea regarding space is not, however, one of very much importance. The theory concerning time is very much more worthy of remark. The idea of unbeginning, unending time is, we all feel, a very staggering one; the Reason may affirm it, but the Imagination cannot grasp it. What relation can any reach of ages, however long,—embodying a series of events however protracted,—what relation can it bear to eternal duration? Millions of millenniums are no more than a second to eternity. It seems as if eternity must be left empty, because no possible train of events could fill it. But the difficulty may be solved by supposing the train when ended to begin again. If we assume that all things move in cycles, then we shall have less difficulty in fancying time always progressing, yet always occupied. This is the theory that is found not only in Hinduism, but more generally throughout the East. The idea of the whole of time being measured out by revolving periods is one naturally suggested by visible phenomena. The day, the month, and the year furnish recurring cycles, which are very easily noted. The astronomical knowledge of the Hindus enabled them to form the idea of cycles more extended and less obvious. We find in one of their books a calculation of the number of years that must elapse from the moment when the sun, the earth, and the five planets are all in the same straight line till the point of time when they shall again occupy the same position. As the length of each planetary year had to be determined, as well as the actual position of

each planet fixed, before this calculation could have been made, we see that the advance which had been made in those early ages, both in mathematics and astronomy, was by no means small. The motion of translation, which modern science has discovered in our solar system, indicates a cycle of most stupendous magnitude. I believe it has been calculated that it will take our sun, with his train of attendant planets, eighteen millions of years to perform one revolution round the centre of the stellar system to which he belongs; and this enormous period may be only a trifle to the cycle measured out by the revolution of that stellar system itself round some other point in space. We may notice that not only does nature measure out our time cyclically, but the mechanism by which we mark time proceeds on the same idea. A clock is a mechanical arrangement of wheels, and on its dial face we have the circles travelled over by the second hand, the minute hand, and the hour hand; in short, a system of conveniently determined cycles. It is not unlikely that the whole material universe is under cyclic law, and that our own immortal being, taking now that immortality for granted, may have its history divided by cyclic periods in a future state as in this present one. What strikes us, however, as the strange peculiarity in the Eastern idea is this, that each ultimate cycle should be considered as the unvaried and invariable repetition of the same identical phenomena. Perhaps even a tinge of absurdity appears to characterise such a theory; but we must remember that each great cycle is looked on as exhausting all possible phases of phenomena. Our common conception of eternal time may be compared to a straight line, of which we can see neither the beginning nor the end. Our imagination embraces a certain portion of time, but in striving to think of it as eternal, we have to add on perpetually to each end, going back to the past, and onwards to the future, but never reaching a limit in either

direction. The cyclicist comes to you and says, "This line, that seems to you to be straight, only seems so because your vision is so limited. It is an arc of an immense circle. A line drawn on the ground seems straight to your bodily eye, but it is in reality a portion of a circle of the earth's circumference. So in reference to time. Any particular part is only a little fragment of an ultimate cycle." If it be objected that the combinations of phenomena are really infinite, it may be rejoined that mathematics teaches that an infinite series may be summed up into a definite quantity. Nay, is not a second of time, itself capable of absolutely infinite sub-division. Eternity must be a fixed whole, and not an unending series; and the easiest way to image it as a whole, is under the idea of a perfect cycle.

We may notice that although we do not accept the Oriental theory, we have nevertheless adopted the symbolism which expresses it. In the Masonic coat of arms, and other such devices, the surrounding circle represents eternity. A serpent with its tail in its mouth is a favourite artistic variation of the circle, and is frequently associated with the Deity in paintings. I remember seeing, at Florence, a grand fresco on the ceiling of the principal apartment in one of the old palaces of that most illustrious city; the fresco consisted of a vast multitude of figures, arranged in groups, so engaged as to image out the various aspects of all this many-coloured life of ours — commerce, war and husbandry, feasts, nuptials and worship, our toils, joys and griefs, from the cradle to the grave, and on to judgment, and that great future which lies beyond. Round about the whole varied scene, enclosing all the acts of the stirring touching drama, was coiled the vast dark serpent; and we might fancy that had the eye of some ancient stately white-haired Brahmin rested on that rich product of the Italian pencil, he would have smiled approvingly as he read the meaning, that eternity is only the ceaseless repetition

of that splendid mournful drama, for which earth and heaven form the mighty stage, and gods equally with men come forth as players.

Let us now turn our attention to the question of Being. What is it that exists, or what relations are there between such things as do exist? Eastern theosophy concisely answers by asserting the Unity of Being. Let us endeavour to approach this idea from the scientific side.

The highest results of modern research and discovery seem often to lead us back again to the first simple ideas which preceded the birth of science. Something of this kind may perhaps be affirmed of the idea of a cosmos, or complete physical universe, made up of many parts constituting one great whole. The savage looks upon the sun, moon and stars, as the lights that are fastened in the blue roof of that great house of his, which has the whole earth for its floor, just as splintered pinewood shines from the covering of his rude wigwam. The progress of the physical sciences in later times has served to develop very fully the cosmical idea. The discovery of gravitation shows that all bodies exert force on each other throughout the immeasurable reaches of space. Spectrum analysis has revealed that the same ingredients are found in other worlds, which have gone to build up our own. In regard to telluric phenomena, we have learnt how science runs into science, and how closely knit the various operations of nature are throughout the globe. In short, we have come to look at the universe more as one great whole, of which all the parts and processes are bound together by the closest links, than as a vast congeries of systems of bodies and groups of phenomena. The cosmical idea is that of the unity of the physical universe.

But man soon felt that he differed from all other beings of which his senses gave him knowledge. He became

reflectively conscious of a higher inward nature ; of attributes of reason, affection and will, which belonged to a soul within him. With this came the conviction, that soul or spirit in some infinite form must of necessity exist. These two questions then had to be solved : What was the relation of the Supreme Spirit to the physical universe ? and What was man's relation to the Infinite Spirit ? The relation of the Great Spirit to the great world had to be determined. In seeking to accomplish this, a guiding light was afforded by man's own constitution, especially as viewed in its development. The life of the individual man began in a seminal germ. The vitality inherent in that germ under favouring conditions led to its expansion and the gradual shaping of the parts and organs, till the embryo had grown into the full-formed human being. In the same way the seed by its own vital force could shape itself out into a mighty tree. The radical life of the germ was the prime agent in producing the full development, and that life still existed diffused throughout the entire plant or animal. Let the same idea be applied to this great universe. At first there was nothing but the primal molecule, the seed of all things yet to be. From that atom was the whole universe developed, and the principle of life which existed in the atom animates the expanded system. Such is the fundamental theosophic idea. Put into the form of legend, it runs thus. The supreme being called Brumhu (not to be confounded with Brahma, the first member of the so-called Hindu triad) has two alternate states of existence. While he is in one state it is the night of Brumhu, and when he passes into the other it is the day of Brumhu. During the night he exists as an atom, which atom includes all being, outside of which there is nothing. In this state he is wholly unconscious, and remains thus for an enormous period of ages. At length he becomes conscious of himself, and says "I am." With this he immediately

begins to expand ; the five elements of fire, air, earth, water and space issue forth from him, and from these the heavens and earth, gods and men, and all things else are formed. The day of Brumhu has begun, and a series of ages pass away full of life and incident, till at last the night approaches ; all things are resolved into the five elements again ; these rush together and contract, till they reach the dimensions of the original molecule. The night of Brumhu has then set in, to be succeeded in due season by the day ; and day and night go on in the self-same cyclic round for ever and for ever. This general theory may be termed Pantheistic, because in it God and the universe are confounded and made one. The Theistic idea separates the essence or substance of the Deity from the universe ; although it acknowledges the stamp of divinity on it. In every product of human thought and skill the material employed is made to coalesce, so to speak, with an effluence from the human spirit, and it remains an external revelation of the man who made it. In the dome of that stupendous structure, the Basilica of St. Peter's at Rome, in the colossal greatness of the marble Moses, in the prophets and sybils portrayed on the ceiling of the Sistine Chapel, and in the terrors and glories of the Last Judgment which covers its awful wall,—in these works we have not mere stone and colour, but emanations, as it were, from the mind and heart of Michael Angelo. We learn the man from the witness of his works, but we are not in the least danger of confounding his personal existence with that of the marble or the canvas. So God shows what he is, in the theistic view, through the universe he has made. Creation is the visible garment in which the Invisible wraps himself, and enfolded within which we recognise the majesty of his mighty presence. Believing in his omnipresent sustaining power and rule, Theists often employ, though in another sense, words that might bear a Pantheistic turn. “In

him we live and move and have our being." "By him all things consist."

"Thou art, O Lord, the life and light  
Of all this wondrous world we see;  
Its glow by day, its smile by night,  
Are but reflections caught from Thee.  
Where'er we turn, Thy beauties shine,  
And all things fair and bright are Thine."

We have given the legendary form of Pantheism, and have seen that its fundamental idea is the identity of the Supreme Being and the universe, of God and the world. But Pantheism has several different phases. First, we have it in its most materialistic or positive form. To recur to our former illustration, drawn from the development of the tree from the seed, or of man himself from a vital germ: Whatever is found in the completed organism may be said to have been implicitly contained in the seminal source of being; and whatever has a place within the bounds of the universe lay hid in the First Great Cause, and still continues a part of himself. True it is, the analogy fails in one point. The materials out of which trees and animals are built up are actually drawn from without, although assimilated, modified, and incorporated, according to the laws of organic life in each particular structure. The oak is indeed developed out of the acorn, but its stubborn timber and umbrageous leafage have been made up of atoms, derived through its roots from the sustaining soil, or by its pores from the ambient air. The vital force gives the form and regulates the processes, but the materials must be gathered from abroad. In the development of the universe, however, there could be no such alimentation; and whatever exists is part and parcel of the effluence from the divine germ, and an integral portion of its developed existence. In one word, all things are God. However alien such a theory may be from our modes of



thought, and however erroneous we may believe it to be, it becomes us at least to understand what it is before pronouncing on it. We hear a good many people making themselves exceedingly merry at the notion of "those black fellows" believing in such an insane absurdity as that a stone was God, or a stick was God. The only amusing thing about it is the ignorance and conceit of those white fellows that make such remarks. When a grave, learned, and dignified Brahmin gives utterance to his religious faith in such a form of creed, we may at least suppose that, however far astray he may be, there must yet be something in his belief that recommends it to his reason, and that he cannot attach credence to a mere string of futilities. What he says is, not that everything is God,—that is, that each individual object is the whole of deity,—but that all things are one God, or, in other words, that the entire universe is included in the Infinite Being. The mistake commonly made is just as if one got a paring of Demosthenes' finger nail, and, holding it up, cried out, Behold the great Athenian orator. According to what we have called the materialistic school of Pantheism, the Supreme Being is not looked on as possessed of personality, volition, or moral attribute. He may perhaps be best described as the substance of the universe, using the word *substance* in its philosophic sense, for that which underlies all phenomena. All apparent qualities, whether mental, moral, or physical, celestial, terrestrial, or infernal, are merely different modes of manifestation of the one universal substance. Everything that happens is but a phenomenal and outward change, the underlying essence being still the same. We observe one creature exist successively as an egg, a caterpillar, a chrysalis, and a butterfly. The same element is seen to pass from its frozen condition as ice to its liquid state as water, and finally to be sublimated into steam, only to form raindrops again, or return in

rattling hail. These are analogies which point to a subtler and sublimer truth. Everything in the world changes, fades, and fleets away. It is one ceaseless and perennial round of alterations. But under all these changes we are to recognise the one changeless, essential Being. The varying phenomena of the world no more affect that inner substance of which they are the outward manifestations, than the iridescent colours which play over the facets of a polished diamond affect the unalterable permanence of that most lustrous gem.

Most opposed to the materialistic phase of Pantheism is the Idealistic school. I should rather say, seemingly opposed, for those apparently antagonistic positions are found to shade away into one another. To the idealist there is no such thing at all as matter, or worlds, or men, or aught else. There is only One who exists, and all things that men commonly deem actual and real are nothing but phantasms and shadows. A man goes to sleep, and in his sleep he dreams; or he may dream when he is awake, and in his reverie his mind is filled with visions; he beholds great cities and gorgeous palaces, prancing steeds and royal chariots; he sees fields where husbandmen toil and homes where children play. Scene after scene passes before him. Many a life drama is acted out. There are weddings and funerals, deeds of kindness and acts of cruelty, things glorious and things grotesque—all full of seeming life and vividness, and yet nothing but delusions of a dream. So is it with this which we call the actual world. It is nothing but delusion—but shadowy representation. God alone is, and all things else are but thoughts of God. It is wonderful to find what a hold this theory has taken of the Hindu mind, so that a poor coolie, with nothing to cover his dusky person but a pennyworth of cotton rag, will gravely assure you that all things are only *maya*, that is, delusion. We have produced Bishop Berkeley,

a famous idealistic philosopher, a most loveable and sweet-spirited man; but I scarcely imagine that Hodge, as he crushes the turnips under his iron-shod heel, walking across the fields to the beerhouse, could tell you much about the want of valid evidence for the existence of a material world.

Another variety of Pantheism may be called the Psychical theory, for want of a better word, although, as we shall notice presently, the expression is open to objection. The Idealistic theory denies the existence of anything except a supreme thinking mind. The Materialistic theory makes matter equally with mind constituents of Deity, and indeed reduces the Supreme Being to something equivalent or not much dissimilar to the organic life of a plant or animal. The Psychical theory, on the other hand, recognises the duality of mind and matter, and holds that the spirit of man is more akin to the Supreme than either his bodily frame or anything else material. It does not deny that the physical universe is a portion of the Infinite being, just as the body is part of the man. But the duality which is characteristic of human nature is held to belong equally to the divine. The Supreme Being is regarded less as the organic life of the universe, and more as its intelligent and ruling mind. He is the soul, of which the world is the body. With this idea is connected an interesting view of the nature of the human spirit. Each individual soul is regarded as a portion of the great Spirit, disjoined for the time, so as to constitute a separate being. When the tide ebbs away from a rocky shore, every wave-worn hollow is left filled with its own portion of salt sea-water. Thousands of these rock pools may be found by the enterprising naturalist who is bold enough to risk the perils of slippery weed and sharp-pointed stone in pursuit of the rare and beautiful creatures that may be there. Every little pool is a mimic sea, sharply defined by its own rocky walls.

But by-and-by the waves roll in again, and the pools are separate no more, but lose their isolated life in the unity of the one great ocean. And even thus portions of the Infinite Spirit are bounded for a season by the limiting surroundings of a finite lot; but by-and-by they shall return and be merged in the Infinite again. This theory of the human spirit lies at the foundation of two celebrated Oriental ideas, namely, transmigration and absorption. The first of these is perhaps the best known of all the theosophic ideas the East has produced, as even in very early times it spread very widely, and was imported into Europe by Pythagoras and other philosophers. The Greek name *metempsychosis* expresses the idea very well, which is, that the soul or psyche passed from one body into another, and became thus the animating principle of successive physical forms. This idea probably recommended itself to men's minds partly from what they observed in the processes of the material world, in which the form of matter changes without the matter being destroyed. The researches of modern chemistry have impressed this truth on us with the utmost force, as we are now able to determine the exact quantities of all the resulting substances after combustion, natural decomposition, or any other mode of apparent destruction; so that we are accustomed to say that not an atom of matter has perished since its creation. In a rude way the same truth was observed in early ages. The body dies and disappears, but it has only been resolved into its elements, which enter again into new forms of being. If matter then be so absolutely indestructible, shall we suppose that a higher essence perishes? Is it not more reasonable to believe that it is merely transferred to another organism? New bodies are formed out of the old ones, and a new life is but the old life back again. A question might be raised, however, as to the principle that determined the nature of the new existence. Was it all a matter of chance whether the

soul of Solomon put on the outward lineaments of King James the First, of learned memory, or took up its abode within the hide of Sancho Panza's ass? This question has received solution, and the whole Eastern theory regarding the general subject may be thus briefly stated. The portion of the Divine Spirit within an individual is doubly prisoned, first by the outer and coarser shell of the body, and then by an inner integument, which is not material. It is as if a little of the sea water of our previous illustration were enclosed in a fine membrane, and this again confined within a box. To set the water free, it would be needful not only to destroy the box, but to pierce the membrane also. So the portion of divine spirit can only return to the infinite when its material and immaterial prisons have both been thrown off. Death destroys only the outer one, the body, and the spirit, still confined, is transferred to another body. But the wise man who succeeds in ridding his spirit of its inner bonds attains at once to absorption into the Infinite. Now this inner environment of the spirit consists of the passions, feelings and appetites of our nature. We might venture to call it the psyche, or soul, making use of the Greek distinction between that and *πνευμα*, or spirit. The spirit is divine; it is seated within the soul, as it were, and works through those affections and feelings which are merely human, or have reference to the organs of the body and the outer world. You will remember that in the Greek Testament the *ψυχικος ανθρωπος* is about equivalent to *σαρκικος ανθρωπος*, and is put in opposition to *πνευματικος ανθρωπος*. The spiritual man is the opposite of the carnal man, and the latter is much the same as the soullly man, if such a barbarous word can be pardoned. Perhaps we might adopt the Coleridgian phraseology, and say that the fleshly man is the man who is ruled by the understanding, and who is by consequence the antagonist

of him who follows the reason. But to return. It is our highest duty, say the Hindoo sages, to annihilate all the passions and affections. This is to be accomplished by a complete withdrawal from the world, and leading a life of isolated contemplation and rigid austerity. By so doing, the spirit will be set free at death to return and be merged in its great original. The souls of all, however, who interest themselves in the common concerns of life, must reappear on earth by a new birth, under some form which is determined by the character of the life they have led. The excellent are rewarded by receiving a higher birth, and the wicked are punished by being made to assume some degraded and miserable form. Absorption, however, is the final end of all. The good attain it soon; the wicked are purified by the purgatorial process of thousands of births, till they reach absorption also. So familiar is this idea to the Hindus that when they see the sufferings of some wretched beast, or hear some tale of misfortune, it is quite common to hear them remark that the sufferer must have sinned grievously in some former birth. This idea seems to have been hinted at in the question of the disciples of Jesus, when they asked, "Master, who did sin, *this man* or his parents, that he was born blind?" The wealthy and prosperous, on the other hand, are regarded as enjoying the fruits of that merit which they had acquired in a previous existence. The idea of the character of one life determining the nature of the next is not without a sort of fanciful beauty, and leads one to think of Mendelssohn charming the twilight of some myrtle grove with lovelorn trills, under the form of the sweet nightingale, or of Grimaldi playing mischievous pranks at some old lady's breakfast table, under the guise of her pet monkey.

The rules laid down for the ascetic life by which absorption is to be obtained are utterly beyond the powers of the

human frame, and the tales told of what their sages have done are simply incredible. That a holy man should sit under a tree for months and years without opening eye or moving limb, without food, shelter, or drop of water, unconscious of every passing thing, and without any bodily sensations, while his mind was entranced with one changeless conception of the Infinite one, this can only be regarded by us as a figment; and the Hindus themselves acknowledge that such virtue surpasses modern power, and that the ancient might has passed away. Candidates for absorption, however, find means to comfort themselves. If man cannot attain to his ideal, he must bring down his ideal to the requirements of the possible. And thus a Brahman may indulge the flesh with a good many comforts, and yet look upon these as in no wise affecting his candidature for absorption, if he contemplates God in his mind. To hold that illumination of the spirit may raise a man above all concern as to what he does in the flesh is an idea which has shown itself very powerfully even within the history of the Christian church, and the most boastful illuminati have been generally the vilest of men. It is remarkable that asceticism and sensuality have a natural connection; they are like the opposite poles in magnetism, one of which always develops the other; or like the hot and cold stages in a fever. It is said that in India a sort of secret society does or used to exist, the members of which held the doctrine that the proper way to destroy the passions is by exhausting them, which is to be accomplished by indulging them to the utmost extent. It is no doubt true that a painful craving is at once removed by furnishing the appropriate object. A man, for instance, who has always his comfortable meals, never needs to battle against hunger. But to assume, as a guiding principle, that propensities are to be indulged to the utmost, is to urge men to the most brutish excesses and the filthiest crimes. Such a sect

may well keep its secret, for even among the heathen its portion would be infamy.

An interesting question may be asked, as to how it is that absorption should possess such a charm to the Eastern mind as it seems to do. Our own feelings in view of such an end are very well expressed in these words of the Laureate ;

That each who seems a separate whole  
Should move his rounds and, fusing all  
The skirts of self, again should fall  
Remerging in the general soul.

Is faith as vague, as all unsweet ?  
Eternal form shall still divide  
The eternal soul from all beside,  
And I shall know him when we meet.

Absorption seems but another name for annihilation, and our instincts shrink from an extinction of being, according to the sentiment Milton grandly places in the mouth of Belial,

“For who would lose,  
Though full of pain, this intellectual being,  
Those thoughts that wander through eternity,  
To perish rather, swallowed up and lost  
In the wide womb of uncreated night,  
Devoid of sense and motion?”

It has been suggested, in answer to such an enquiry, that the Hindu does not enjoy life as we do. His vital energy is feebler, and he feels more the burden of the flesh and the troubles of an earthly lot, in the semi-civilised condition in which he lives. This explanation seems to me somewhat unsatisfactory. I should rather seek the solution in believing that absorption is not in their view what it seems to us ; that they do not regard it as the cessation of individual existence, but the attainment to an unlimited being. Let me



endeavour to explain this by a reference to some of our own ideas.

When the mind is greatly moved and elevated by the contemplation of nature, we feel as if we were raised out of ourselves, our life set free from personal limitations, and mingled and made one with nature's life. Observe Tennyson's language in addressing the churchyard yew—

And gazing on thee, sullen tree,  
Sick for thy stubborn hardihood,  
*I seem to fail from out my blood,*  
And grow incorporate into thee.

The same idea, of commingling our life with that of the great universe, is touched on in the following passages, from Byron and Wordsworth—

"Then stirs the feeling infinite, so felt  
In solitude, where we are least alone:  
A truth which through our being then doth melt,  
And purifies from self."

"Nor less, I trust,  
To them I may have owed another gift,  
Of aspect more sublime; that blessed mood,  
In which the burden of the mystery,  
In which the heavy and the weary weight  
Of all this unintelligible world,  
Is lightened: that serene and blessed mood,  
In which the affections gently lead us on,  
Until the breath of this corporeal frame,  
And even the motion of our human blood,  
Almost suspended, we are laid asleep  
In body, and become a living soul:  
While with an eye made quiet by the power  
Of harmony, and the deep power of joy,  
We see into the life of things."

"And I have felt  
A presence that disturbs me with the joy  
Of elevated thoughts; a sense sublime

Of something far more deeply interfused,  
 Whose dwelling is the light of setting suns,  
 And the round ocean, and the living air,  
 And the blue sky, and in the mind of man  
 A motion and a spirit, that impels  
 All thinking things, all objects of all thoughts,  
 And rolls through all things."

Besides this mode of living a wider life than our own, by entering into universal nature's being, we can rise beyond ourselves in living a wider human life. Men of comprehensive intellect, deep heart, and elevated aim often feel, and strive, and live as representing so to speak the consciousness of a whole community. The great leader of Israel's hosts through the wide wilderness was such a man; a man every beat of whose heart was for his people. We believe also in a greater one, whose life-history was the conflict and triumph of all humanity. Then there is still another thought. The most pious souls have longed for a full and ever present consciousness of a mutual indwelling of themselves and God. This has not been confined to the Christian faith; but scarcely any stronger expression of it could be found than is contained in the Christian writings. "Abide in me, and I in you." "I in them and thou in me, that they may be made perfect in one." "I am crucified with Christ; nevertheless I live; yet not I, but Christ liveth in me." The mysticism of all religions, however, has seized on the same idea, of what may be called the spiritual absorption of the human soul in Deity. Of course, none of these ideas are identical with the theory of absorption as Hinduism teaches it, but they seem to be sufficiently related to it to justify us in suggesting that it is an elevation and not an extinction of being the Eastern devotee desires.

Without taking upon ourselves to say what the poet actually means, we may observe an echo of the Eastern idea

in some expressions in the following lines from "In Memoriam" —

Thy voice is on the rolling air ;  
 I hear thee where the waters run ;  
 Thou standest in the rising sun ;  
 And in the setting thou art fair.

What art thou, then ? I cannot guess.  
 But though I seem in star and flower  
 To feel thee *some diffusive power*,  
 I do not therefore love thee less.

My love involves the love before ;  
 My love is vaster passion now,  
 Though *mixed with God and nature thou*,  
 I seem to love thee more and more.

Perhaps another suggestion may be offered, as to the charm the idea of absorption seems to possess to the Eastern mind, if what has been said above be not deemed appropriate. The idea of each human spirit being endued with a separate immortality, and destined to an eternal individual history, seems quite alien to the general strain of all speculative philosophisings. The prevailing idea seems to be that this whole great system of things must come to an end, and its materials be used again in shaping the new system that shall take its place. Every separate philosophy had its own theory of the nature of the dissolution and the recreation, but all agreed pretty fairly in the point of an ultimate resolution of all things into their primal elements, whether these were material atoms or diviner essence, previous to the commencement of a new grand epoch. The cyclic revolutions of Eastern speculation include this idea, as we have already explained. It therefore became necessary to accept the idea of the extinction of our personal existence. Perhaps, after all, the conception of our ultimately ceasing to be is not so alien to us as some have supposed.

It might fairly be argued that the necessity of eternal being, of a life which we never can throw off, is much more appalling. Under this view, we feel that last resource cut off by which we might escape from the evils that befall us. If we cannot cease to be, our misery also may have no end. The thought of dropping into nothingness may therefore have its charm. Once accepted, the mind proceeds to idealise it, and invest it with beauty and power. What is the noblest, sweetest life, but that which is most steadfast, serene and tranquil, where agitations all have ceased, and passions do not stir. That perfect rest is blessedness. Is not death even such a rest? Not the baser death that resolves the fleshly frame into its kindred dust, but the nobler step by which the spirit passes from its separate prisoning, to be lost in the infinity of its kindred spirit. We know how powerfully this feeling has been wrought out in splendid works of art, in which death is idealised as the great friend of man, the soother of the sorrowing, and releaser of the weary and toil-broken. May not such a feeling lie under the yearning of the Eastern devotee for that absorption which shall make cease to be the suffering and burdened creature, because he shall be lost in God. As illustrative of the feelings we have touched on, let me add another quotation or two from our own poets. In his Ode to a Nightingale, Keats has the following stanza :—

“Darkling, I listen ; and for many a time  
 I have been half in love with easeful Death ;  
 Called him soft names in many a mused rhyme,  
 To take into the air my quiet breath ;  
 Now more than ever seems it rich to die,  
 To cease upon the midnight with no pain,  
 While thou art pouring forth thy soul abroad  
 In such an ecstasy !  
 Still wouldst thou sing, and I have ears in vain  
 To thy high requiem, become a sod.”

From that new masterpiece of Tennyson's genius  
 "Lucretius," the following lines are taken :—

"The Gods, who haunt  
 The lucid interspace of world and world,  
 Where never creeps a cloud, or moves a wind,  
 Nor ever falls the least white star of snow,  
 Nor ever lowest roll of thunder moans,  
 Nor sound of human sorrow mounts, to mar  
 Their sacred everlasting calm ! and such,  
 Not all so fine, nor so divine a calm,  
 Not such, nor all unlike it, man may gain,  
 Letting his own life go."

"And therefore now  
 Let her, that is the womb and tomb of all,  
 Great Nature, take, and, forcing far apart  
 Those blind beginnings that have made me man,  
 Dash them anew together at her will  
 Through all her cycles — into man once more,  
 Or beast, or bird, or fish, or opulent flower."

"O thou  
 Passionless bride, divine Tranquillity,  
 Yearned after by the wisest of the wise.  
 Who fail to find thee, being as thou art  
 Without one pleasure and without one pain,  
 Howbeit I know thou surely must be mine  
 Or soon or late, yet out of season thus  
 I woo thee roughly, for thou carest not  
 How roughly men may woo thee, so they win.  
 Thus, thus : the soul flies out and dies in the air."

I cannot pursue these topics any further at present, and am afraid I have trespassed on your patience too long. Let me say, in conclusion, what is of itself sufficiently obvious, that it is not the object of this paper to guide the learned in their researches, but that I have endeavoured to seize some general

ideas which have struck me in a desultory study of the subject, and to develop these freely from our own point of view; to the intent that it may be seen that, besides their mythological absurdities, Eastern systems contain some philosophic elements. The proper religious aspects of the subject cannot of course be entered on here.

**TWELFTH ORDINARY MEETING.**

**ROYAL INSTITUTION, 6th APRIL, 1868.**

**J. BIRKBECK NEVINS, M.D., VICE-PRESIDENT,  
in the Chair.**

The routine business of the Society having been transacted, the following Paper was then read :—

## ALCHEMY.

By MR. E. DAVIES, F.C.S.

THERE is great interest in looking back to the origin and early history of any of the sciences, to the study of which we have devoted ourselves. In the light of present knowledge, we see the errors into which our predecessors fell, sometimes with pity, which might be tinged with contempt, but for the remembrance that we are fallible, and that our speculations and theories may provoke a smile in days to come; and sometimes with admiration for the energy and perseverance which those displayed who laid the foundations on which we have built. Thus the astronomer thinks of the Chaldean shepherds and Eastern sages, who, without optic aids, and in spite of false theories, attained such marvellous acquaintance with the motions of the heavenly bodies. He smiles at Astrology, and rejects much that they held true, but he thoroughly admires their devotion to science, and their unwearyed efforts to thread the mighty maze of the universe. The student of natural history by no means expects ever to see all the marvellous creatures which Pliny describes, but he can take a lesson from his life-long research into nature, and like him strive to see all that he can, taking warning from him not to believe all that is told by travellers.

Chemistry presents in the past the same mingling of chaff and wheat which is seen in the gatherings of other sciences, but perhaps it was more loaded with error than any of them. This is due to many causes. One was, doubtless, the difficulty of tracing a substance through the protean



changes of colour and other properties which it undergoes in its various combinations. Whilst, in other sciences, the student has to deal with what he sees, the chemist has generally to deal with what he cannot see. Take iron, for example; who would suspect its presence in the ore, or in its salts, until the knowledge was imparted, either by instruction or by patient experiment? Thus the early chemists often only educed, when they thought that they had produced. The waters of certain mines were supposed to have the power of transforming iron into copper. True, the iron disappeared and copper replaced it, and nothing but a power of analysis, which was not then possessed, could explain that the copper was in the original liquid, and that the iron simply took its place in solution. Another source of error was, the mystical phraseology in which the Alchemists chose to conceal, rather than to reveal, their discoveries. Another, and the greatest, was the setting up as their aim an object far in advance of their abilities. The discovery of a means of transmuting base metals into gold, and of a medicine which should cure all diseases and confer immortality, was the object of their fond aspiration, and with their eyes fixed on these delusive phantoms they overlooked the treasures at their feet. These were truly great ideas, but they were beyond their reach, and in striving for them they spent a life of toil, and died in disappointment.

Many of the useful arts depend on chemical processes, in the sense in which we use the word "chemical" now. Metallurgy, dyeing, the manufacture of porcelain and glass, were all known in the early ages of the world, and are all chemistry in practice. Had mankind simply gone on accumulating facts, leaving theories alone until a foundation was laid for them, we should have heard nothing of Alchemy. As however, this course was not followed, we find the name of Chemistry, *χημια*, applied to the art of making gold and

silver in the fifth century, in the earliest work known in which the word occurs. This work, entitled, *A Faithful Description of the Sacred and Divine Art of making Gold and Silver*, by Zosimus, the Panapolite, carries back the art to a far distant period, for it attributes it to the sons of God mentioned in the 6th chapter of Genesis, who, it states, were angels allured from heaven by the charms of women, to whom they imparted the secret of making precious metals. Suidas, in his *Lexicon*, written in the eleventh century, says, under the word *χημεία*, "The preparation of silver and gold. The books on it were sought after by Diocletian, and burnt, on account of the new attempts made by the Egyptians against him. He treated them with cruelty and harshness, as he sought out the books written by the ancients, on the chemistry of gold and silver, and burnt them. His object was to prevent the Egyptians from becoming rich by the knowledge of this art, lest, emboldened by abundance of wealth, they might be induced afterwards to resist the Romans." It is, however, doubtful whether Alchemy can claim such high antiquity as this; for the silence of Latin authors, especially Pliny, on the subject, would lead us to believe that it took its rise among the Greeks at a later date. The earliest works on the subject are Greek, and a long list, comprising eighty works, is given in Boerhaave's *Chemistry*, 1753. Many of these evidently bear feigned names, such as Isis, the prophetess, to her son Horus; Moses, the prophet, on chemical composition; Cleopatra, wife of Ptolemy, to whom are attributed four works. They are supposed to have been principally the works of monks, written between the fifth and eighth centuries. They all mean by chemistry the transmutation of imperfect metals into gold or silver.

From the Greeks it passed to the Arabians, amongst whom it obtained its prefix "Al," and, travelling through Spain, in the eleventh century, began to spread over Europe.

Among the Arabians the most remarkable was Geber, if indeed he be not a myth, as so many of the Alchemists seem to be. He is said to have lived in the eighth century, and was in possession of considerable chemical knowledge. He knew the carbonates of potassium and sodium, saltpetre, alum, sulphate of iron, borax, corrosive sublimate, oxide of mercury, milk of sulphur, and nitrate of silver; also sulphuric, nitric, and acetic acids, and the preparation of caustic soda and sal ammoniac. This is certainly a very respectable list, for that early date. Unfortunately, all that was valuable in his researches he considered as mere accessories to the great object of making gold. It was Geber who first gave rise unwittingly to the view that the same philosopher's stone which would transmute base metals into gold, would also heal all the diseases to which man is subject. In the metaphorical language which he employed, the base metals are leprous men, and gold a healthy one. Gold prepared in a certain way he supposed could change other metals into its own likeness; hence he says, gold thus prepared cures lepra, cures all diseases. This, taken literally, appears to have originated the idea of a universal medicine, which has never since deserted the human mind. From the elixir vitæ to Holloway's pills, there have been constantly offered to the world panaceas for every ill, remedies for every disease.

For four centuries after his death little appears to have been written of importance, but about the thirteenth century several able chemists arose. Albertus Magnus and Thomas Aquinas were among these, but perhaps the most renowned, and to Englishmen the most interesting, was Roger Bacon. Eighteen works by him on Alchemy remain. He was acquainted with gunpowder, though it is not certain that he was an inventor of it. He says, "Mix together saltpetre, *luru vopo con utriet*, and sulphur, and you will make thunder and light-

ning, if you know the manner of mixing them." Here we have an example of the manner in which the Alchemists only gave a half confidence to their readers, and threw a veil of mystery over their processes.

Raymond Lully was a friend of Roger Bacon. In his works, especially the *Philosophical and Chemical Experiments*, we have a tolerably clear description of the method of making the philosopher's stone; at least, clear for an Alchemist. Like all the processes which I have seen, it is impossible to follow it quite through; there is sure to be some reaction quite contrary to anything in modern chemistry, or else some material is directed to be used under a name which cannot now be identified. The white elixir of Lully seems to consist of a mixture of chloride and nitrate of silver, and of it one ounce is to be added to one ounce of silver and seven ounces of arsenide of copper, and you are to get nine ounces of pure silver. The red elixir for making gold is not so intelligible as the white.

Time would fail to give even a list of Alchemists; their works, for the most part mere tracts, are numbered by thousands, and of most, only the titles now remain. Whether we should be much wiser by studying "*Verbum abbreviatum de leone viridi*," "*Rosa novella*," "*Flos florum*," *et id genus omne*, may now be doubted. A few words should be said, however, about two alchemists, Basil Valentine and Paracelsus. The former was the first to introduce chemical substances into medicine, and so began the war between the Galenists and the chemists, which raged in the sixteenth century. Medicine was then at a very low ebb; the teaching of Galen and the Arabians, especially of Avicenna, was blindly followed, and bleeding, purging and emetics constituted the routine of medical treatment. The remedies used, drawn from the vegetable and animal kingdoms, were often disgusting and absurd, and generally useless; and thus, when a new school

of medical chemists arose, it met with a favourable reception. Valentine, in his *Triumphal Chariot of Antimony*, vaunts the preparations of that metal, as little less than panaceas; and he also seems to have introduced mercurial compounds. Armed with remedies of such powerful action as these, the chemists laughed to scorn the pretensions of the Galenists, and certainly did kill or cure, whilst the Galenists did little else than kill. Of these bold innovators, Paracelsus, a strange medley of genius, madness and knavery, with impudence unbounded, and a mysticism which, founded on the Cabala, owed much to his own wild imagination, drew many disciples around him. All who sought emancipation from ancient trammels, and who believed that all wisdom was not bestowed on their forefathers, followed joyfully this new leader. His diatribes against those who differed from him, and his undistinguishing attacks on old systems, were sometimes unjust, and perhaps weakened his influence; but it would seem that no new views can ever make themselves felt, unless they are urged with an enthusiasm, or even violence, which in after years, when they are received as matters of course, appears uncalled for. The exclusive search after the transmutation of metals was now abandoned, and the alchemists became chemists. From that time more practical objects were aimed at, and light began to dawn upon the world in reference to the nature of the substances of which our earth is formed, and new discoveries in manufactures flowed from the investigations made by men whose minds were not solely devoted to one object.

The history of Alchemy might here be supposed to end, but such a fascinating pursuit as the one which promises boundless wealth has never lacked devotees, and even to our own times men have been found who will not believe that Alchemy is but an *ignis fatuus*. They are unknown to the world, but now and then they are to be met with, and a few

years ago one applied to a chemist in Manchester for a situation as assistant. He had spent all his money in the bottomless abyss of Alchemy, but his faith was firm in the possibility of the attainment of his object.

In the *Times* of April 6th, 1865, was the following advertisement—"To students in Alchemy. Any gentleman who may require an assistant can be recommended to an industrious foreigner, who has studied the books of the Alchemists, for the last fifteen years, and is a good experimentalist. He is now in Transylvania, but every information will be given by applying to Charles F. Zimpel, M.D., 182, Marylebone Road."

In 1862, the price of Bismuth went up in six months from 9s. 6d. to 20s. per lb., and it is said that this was occasioned by a joint stock company buying up all the bismuth in the market, to convert it into gold. If it were so, I fear that the shareholders are left lamenting.

In 1866, two Frenchmen, MM. Henry Favre and Juste Frantz, presented a paper to the Academy of Sciences, in which they give a method for transmuting silver into gold. M. Favre also delivered a public lecture on the subject, and generously made the process known. It is very simple, but up to the present time I have not heard of any one repeating it with success.

It may be interesting to review some of the views held by Alchemists as to the constitution of metals and salts. Owing to the mystical method in which they expressed themselves, there is some difficulty in discovering their meaning, but the most favourite view was, that the elements or substrata of all solid bodies are mercury, sulphur and salts. These terms must not be supposed to be used with reference to the substances known to us under these names. Their mercury was a hypothetical body, which might be fusible or infusible, volatile or fixed in the fire,

and in its various forms, or allotropic states in modern phraseology, was the metallic principle. The sulphur also might be either fusible and volatile, or fixed, and was supposed to be the cause of colour in some metals, and of combustibility or oxidizability in others. It was the combustible principle, and, united with the philosophical mercury, constituted all metals. Geber says, "Gold is created of the most subtle substance of mercury, and is of a most clear fixture, and of a small substance of sulphur, clean and of pure redness, fixed, clear, and changed from its own nature, tinging that. Iron is composed of earthy mercury and earthy sulphur highly fixed, the latter in by far the greatest quantity." Other metals are described in a similar manner; and it is remarkable that in Boerhaave's *Chemistry*, in 1753, almost identical views are taught by that clever chemist, as facts not needing demonstration. What was meant by salt is not so clear. They knew how to make many of the salts of modern chemistry, and must have known that they contained the acid and metal from which they had been made, and which could be again extracted from them; and yet they had an idea that there is a saline principle underlying the various salts.

They evidently believed in the existence of matter apart from its properties. These might vary to any degree, and yet the matter itself be unchanged. On this theory, transmutation becomes intelligible, for if the metallic principle in all metals be the same, the alteration of the properties would not seem a hopeless task.

One of the most remarkable things in Alchemy is its relations with Astrology and the supernatural. The very names which the Alchemists bestowed on the metals, and the signs by which they represented them, were those which the Astrologer gave to the sun and planets. Gold, was Sol; silver, Luna; Mercury we still retain; Venus, copper; iron, Mars;

tin, Jupiter ; lead, Saturn. Van Helmont, says, " The stars are a cause of what we treat of, and this cause is not to be contemned." In all the works of Paracelsus are found evidences of a belief in the influence of spiritual beings, of an order inferior to man, in their having no soul, but of superior powers. The beautiful romance of *Ondine* makes us familiar with the name which he gave to the beings inhabiting the waters. For him, nymphs, salamanders, sylphs and pygmies inhabited the air, the earth, the very fire, and had it in their power to impart occult knowledge to the man who could hold intercourse with them. A kind of religious feeling was mingled with the earthly passion for wealth. Many held that only to the pure in heart and life would be given the knowledge of the Divine art, and that in vain would be all manipulation with furnace and crucible, whilst evil passions raged in the mind of the adept. They tell you, " Take, in the name of God, great bay salt," and when you have found out the great secret, you are to " give God thanks and remember the poor." Raymond Lully says to the adept who has followed his directions for making the philosopher's stone, " God grant that you may obtain it, and give unto Almighty God a good reckoning of the health of thy soul." Van Helmont breaks out into the following rhapsody ; " O happy, and thrice happy, is that artificer who, by the most merciful benediction of the highest Jehovah, pursues the art of confecting and preparing that (as it were Divine) salt ; by the efficacious operation of which a metallick or mineral body is corrupted, destroyed, and dyes ; yet the soul thereof is in the meanwhile revived to a glorious resurrection of a philosophical body. Yea, I say, most happy is the son of that man, who by his prayers obtains this Art of Arts unto the Glory of God. For it is most certain that this mystery can be known in no other way, unless it be drawn and imbibed from God, the Fountain of Fountains." I cannot



deem all this hypocrisy; there were no doubt arrant impostors among these old Alchemists, who drained the dupes, who gave them funds to prosecute their researches, of every coin which knavery could extract from credulity; but that there were many with an enthusiastic faith and unwearied perseverance, who toiled with a patience which we can hardly realise, I do not doubt.

Did any of them attain the goal of their labours? To this it is difficult to reply. In many cases, where transmutation seemed to be effected, no doubt trickery and sleight of hand performed the feat, and the gold which came out of the crucible had been concealed in the materials employed, or was in some way introduced; but this will not explain all the cases reported; and unless we are prepared to reject evidence which we should unhesitatingly receive in other matters, the statement that base metals have been transmuted into silver and gold rests on a tolerably sure basis. Not to mention the case of M. Gros, a clergyman of Geneva, or the making of gold in Boyle's laboratory, the account at first hand given by Helvetius, in his *Vitulus Aureus*, appears to bear unexceptionable evidence. Here is the physician to the Prince of Orange, a man of extensive knowledge, by no means credulous, as shown by his writing a book to refute the pretensions of Sir Kenelm Digby and his sympathetic powder, who gives to the world in 1666 a description of his meeting with an Alchemist, from whom, after much persuasion, he obtains a small portion of a substance, not more than the size of half a rapeseed, with which, in the absence of the Alchemist, he converted six drams and two scruples of lead into the purest of gold, sustaining every test. As in all these cases, he saw the Alchemist no more. Helvetius was not himself an Alchemist, and was before rather doubtful of the existence of the philosopher's stone; and if in this matter he deceives us, at least he lies like truth. Another strange case is given

in the life of Dr. Adam Clarke, a learned scholar and commentator.

The question arises, Is it possible that transmutation can take place, judging by the light of modern science? So far as reasoning goes, unaccompanied by direct proof of the conversion of any of the so-called elements into others, I think that there is good reason to believe in the possibility of it. No one speaks of the sixty-four elements as certainly uncompounded forms of matter; on the contrary, in any of the best works on chemistry, we find it expressly stated that it is probable that in time some of them will prove to be compounds. No later than last year, one of our leading chemists, Dr. Frankland, discovered that a substance, which was called vanadium, and supposed to be an element, contained oxygen, and was really an oxide of vanadium. It is true that a new element was thus proved to exist, and so far it is not a case in point, but it shows that bodies may be considered elementary erroneously.

Among the elements there are several sets, generally in threes, which have much in common in their properties, and possess curious numerical relations. Dumas called attention to this long since; and these triads are discovered to be more numerous as further investigations are made. It is well known that chlorine, bromine and iodine are thus closely linked. They all possess an unpleasant suffocating odour, their specific gravities are in regular sequence, and their atomic weights are—chlorine = 355, bromine = 80, iodine = 127. The mean of the extremes is 81.25, and though this differs from the equivalent of bromine by an amount which the accuracy of modern analysis accounts large, there is sufficient approximation to provoke attention. At ordinary temperature, they present us with examples of the three physical states; chlorine is a gas, bromine, a liquid, and iodine, a solid.

Another group consists of the metals of the alkalies, all having a strong resemblance to one another. Lithium has the atomic weight 7, sodium = 23, potassium = 39, sodium being the exact mean, with a common difference of 16. Potassium is again the starting point of another triad. Potassium = 39, rubidium = 86, caesium = 133, with a common difference of 47, almost exactly three times the difference of the former triad. When we remember that in the latter triad the properties of the three metals are so similar, that but for spectrum analysis rubidium and caesium would probably never have been discovered, the peculiar relations of the atomic weight lends irresistible force to the view that these are not totally distinct forms of matter, and that we may hope to prove that they contain some element common to all of them.

There is a similar connection between the group of the metals of the alkaline earths; calcium = 40, strontium = 87.5, barium = 137; mean 88.5. In the salts of these metals, there are strong resemblances, with gradual differences; for example, sulphate of calcium is slightly soluble in water, sulphate of strontia less soluble, and sulphate of barium is almost totally insoluble.

Then, again, there is a group of metals closely allied by chemical properties, usually found together, and having similar atomic weight. These are, iron = 56, manganese = 55, cobalt = 58.7, nickel = 58.7. The last two are so closely united in their chemical reactions, that it is one of the most difficult analytical operations to separate them from one another.

Gold and platinum, beside their high specific gravity, which separates them from the ordinary metals by a wide interval, have almost identical atomic weights; gold = 197, and platinum = 197.4. Indium and Osmium, which constantly accompany platinum, are respectively 198 and 199.2;

whilst palladium and ruthenium, two metals also found in platinum ore, have the same atomic weight, 104.4.

These coincidences, and many others which might be mentioned, are too numerous, in the limited number of the elements, to be the result of chance; and they point to some connection in their ultimate composition.

So far we have seen great similarities of physical state with chemical differences. Another field of study introduces us to substances having the same chemical properties, but diverse physical states. This is allotropism. Who, looking on ordinary phosphorus and on the red modification, would suppose them to be chemically the same? Ordinary phosphorus is yellowish, soft, easily fusible, takes fire at very low temperatures, fumes in the air, and is most freely soluble in bisulphide of carbon. Red phosphorus is a dark red powder, fuses at  $260^{\circ}\text{C}$ ., takes fire at the same temperature, does not fume in air, and is insoluble in bisulphide of carbon. There are also black and white modifications of phosphorus.

Sulphur presents similar variations. There are six allotropic states known to chemists. The ordinary form as obtained by fusion at a low temperature, the native crystalline form, and the flexible or caoutchouc-like state obtained by heating to a high temperature and suddenly cooling, are the best known.

Oxygen is found in at least two allotropic states; the gas as ordinarily prepared, and ozone. The latter in density, possession of smell and oxidizing power differs greatly from ordinary oxygen.

Among the metals, we do not meet with many cases of allotropism, and these are not well marked. Manganese, uranium, titanium, and chromium are considered by Berzelius to have each two allotropic states, and in the compounds arising from each state corresponding differences exist. Iron,

as it exists in the two oxides, proto- and per-, and their salts, presents properties so different that the names ferrosium and ferricum have been given to the two forms, as if there were two metals.

Other arguments may be adduced to show that at present great doubt is thrown on the simplicity of the so-called elements. A distinguished chemist, Sir Benjamin Brodie, has recently brought forward a new method of symbolical notation in chemistry, which requires that several of the elements shall be considered as compounds. It is remarkable that chlorine, bromine, and iodine are amongst these.

One of the most surprising results of modern science is the determination of the nature of nebulae by spectrum analysis. Those which are resolvable are found to consist of incandescent solids, and in them many of the metals have been detected. In the irresolvable, we find the spectra of incandescent gas, no metals are found, and hydrogen, nitrogen, and an unknown third substance are all that are present. Can it be that these are really the primal forms of matter? It is urged that there are no intermediate nebulae, exhibiting a partial condensation, but as only a small number of the nebulae have yet been examined, these intermediate cases may yet be found.

I do not bring forward these reasonings with a view to prove that other metals can be transformed into silver and gold. Probably many other of the elements will be found to be compounds, before copper and lead are shown to be composed of gold and silver, with we know not what. From allotropism we learn, however, that the substance of matter may remain the same whilst its attributes vary, and though this has not yet been carried to the extent of forming a new species, such well marked varieties exist that the line has almost been reached at which these variations become permanent. Again, in what we may call the species of metals,

the variations are in some cases so slight that it is highly probable they are descended from one common stock.

A professor at Gottingen, Dr. Christopher Girtanner, confidently predicts that this century will see every chemist and artist making gold, and that cooking utensils will be made of silver and gold, to the great advantage of health. Whether this be so or not, we should not set bounds to science, or vain-gloriously think that we have ransacked all the stores of nature. As we look forward to the future, with the rich harvest which it is sure to yield under the tillage of the Chemist, let us not forget or scornfully despise the Alchemist. He laboured, and we reap the fruit of his labours. He made the tools with which we work, and mined in the dark to bring forth those treasures of nature of which we avail ourselves in the broad light of modern science. Whilst we may laugh at his speculations, ridicule his processes, and regret his oneness of aim, let us also do justice to the patience, devotion, and enthusiasm of the man who worked for years in vain without losing heart or hope; and do honour to those pioneers who first invaded the trackless wilderness, which now has become rich with flowers and fruits.

## THIRTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, 20th APRIL, 1868.

J. A. PICTON, Esq., F.S.A., VICE-PRESIDENT,  
in the Chair.

Ladies were invited to attend this meeting.

Mr. BYERLEY exhibited a living specimen of one of the four-horned sub-varieties, *ovis ariis Guinensis*, or Guinea sheep, which was brought to England eighteen months ago, from Beda, 540 miles up the Niger. It was given to Mr. Fell by Masaba, King of Beda, who is about one of the most powerful potentates of Central Africa, and king over a large space of country. Masaba had seen but two of these animals, and gave one of them to Mr. F. Dr. J. E. Grey, in a note, gave the following account of the animal :—

“British Museum. My dear Sir,—The photo you have sent me represents one of the many sub-varieties of the Guinea sheep—*ovis ariis Guinensis*. Buffon figures them under the name of “Indian sheep.” They often have manes, pendent ears, and a rounded or rather arched nose ; some have very small horns ; others, like your specimen, more than one pair. They are the sheep of Western Africa. Yours is a fine specimen, in much better case, I suspect, than he used to be in Africa.—Yours truly,

“J. E. GREY.”

All the varieties are known by their long legs and slender tail. They are generally covered only with hair, but some varieties obtain wool in cold districts, which falls off in summer.

The following paper was then read :—

## ON PICTURE PRINTING—CHROMO-LITHOGRAPHY.

BY MR. D. MARPLES.

WHEN, in a previous session,\* I read to you a paper on Picture Printing, which was received with much interest and kindly acknowledged, my illustrations were confined almost exclusively to pictures produced by the ordinary type press or machine, or by this process upon a mezzotint ground. I submitted the opinion that the development of the art of printing at the commencement of the fifteenth century might more properly be designated a revival, than an invention ; and that it arose in connexion with art, rather than with letters, its first productions being, in all probability, a series of outlines printed from wood blocks, at a rude press, to be filled in afterwards by the pencil of the artist. If this were so, it is a natural inference that the success of the experiment led to the far wider application of the art to the production of impressions from wood blocks in imitation of the black letter MSS. of the middle ages, with rude embellishments, and ultimately to the introduction and use of movable metal types.

In bringing down the history of Picture Printing to our own day, I invited your attention to the beautiful works produced by the late lamented George Baxter, who was removed from the scenes of his successful labours at a comparatively early age, and a few specimens of whose works I cannot resist the temptation of bringing before you again, on the present occasion, assured that they will not

\* Vol. xix., page 80.



suffer by comparison with some of the best Chromo-lithographs now before you. Since his death, I am not aware that any one has taken up his particular line of business, which for its successful prosecution and commercial success requires not capital alone, but the thorough practical knowledge of the wood engraver, the printer, the chemist, and the colourman. To his matured experience and skill in all these respects we are doubtless indebted for the beauty and brilliancy of nearly all his works. One or two establishments in London produce works of a very pleasing character, chiefly as illustrations to the periodical literature of the day. But the greater part of these, printed from series of blocks, grained, or otherwise, and marvels of cheapness, fall far below the beautiful works which preceded them.

With these few remarks, I pass on to the subject of this evening's paper, — Chromo-lithography, — and purpose to submit to you a brief history of the art of printing from stone from its commencement to the present time.

The invention of Lithography, as most of you are aware, is of comparatively recent date, and, like its kindred art, Typography, had its origin in Germany, where it was practised for some time, with but partial success, before it was introduced into this country early in the present century.

There can be no question that to Alois Senefelder the discovery is due, not as the result of study and experiment in that direction, but when seeking to adapt the lithographic stone to a very different purpose, — an attempt which, viewed not in the light of modern practice, but one might almost say of common sense, clearly indicated the spirit of the enthusiast, confident in the fertility of his own resources, though baffled at almost every step, and finding them totally inadequate to the accomplishment of his wishes, rather than

the sober judgment of a profound thinker and skilful manipulator.

The early history of Senefelder, as related by himself, while often amusing, is generally both interesting and instructive. He was born at Prague, on the 6th of November, 1771. His father was one of the performers at the Theatre Royal of Munich, apparently a man of large and liberal views, anxious to give his son such an education as would enable him to follow one of the liberal professions. Had the son been permitted to follow his own inclinations, he would certainly have embraced his father's profession, with all its uncertainties ; but, in compliance with parental wishes, he devoted himself to the study of jurisprudence, seeking opportunity for gratifying his predilections for the stage by occasionally performing at small or private theatres, and occupying his leisure in the composition of some trifling dramatic publication. In this way he wrote what he terms a "little comedy," in the year 1789, which was received by his numerous friends with such applause that he was induced to send it to the press, and had the good fortune to clear fifty florins from the sale of it, after defraying the expenses of printing.

With the sanguine temperament of an enthusiast, and moving, as it may be inferred he did, in good society, it is not easy to say what success might have attended his legal studies if he had been able to prosecute them. But the death of his father brought them to a sudden and unexpected close, and threw him upon his own resources before his mind was sufficiently imbued with legal lore to enable him to make his way in the world in the pursuits his father had chosen for him.

As was to be expected, and the opportunity occurring, his first efforts for personal support were in the direction of his early tastes ; but after two years of misery and disappoint-

ment, at several theatres, his enthusiasm cooled, and he forsook the unpromising profession again to try his fortune as a dramatic author. Here again he was unsuccessful, the sale of his next publication, a drama, which could not be got ready for the Easter book-fair at Leipzig, producing scarcely sufficient to pay the expenses of printing it. In order to accelerate the publication of his drama, he had passed more than "one whole day in the printing-office," and naïvely states that he made himself acquainted with the whole process of printing, and thought it so easy that he wished for nothing more than to possess a small printing press, in order that he might become the composer, printer, and publisher of his own productions !

A new direction had been given to his thoughts—new ideas crowded upon his mind ; plan succeeded plan, and experiment followed experiment, but with the same disappointing results. His first idea was to engrave letters on steel, stamp them in forms of hard wood as matrices, and thus produce stereo plates, from which impressions could be taken ; but apparently without any well-defined idea as to how his invention could be applied to improve his resources, and, one would suppose, in ignorance of the fact, though he admits afterwards that he was not ignorant of it, that stereo casts had been taken from metal types, and various works printed from them, long before, both on the Continent and in England. This experiment had to be abandoned, solely because the purchase of a small stock of type, which he then supposed was all that he required, was too much for his limited resources.

Senefelder's next experiment was no other than to learn to imitate the printed characters very closely in an inverted sense, to write these with an elastic pen on a copper plate, to bite them in with an acid, and then to take an impression from them ; in other words, to re-invent the engraver's art,

which had been practised centuries before. The heavy expense of procuring, and the labour involved in grinding and polishing, these copper plates, and the unsuitableness of tin plates, which he had tried as a substitute for copper, brought this plan to a profitless conclusion.

At this period his attention was directed to a fine piece of polished Kellheim stone, which he had purchased as a slab on which to grind his colours. His experiments on the stone, which he commenced at once, and with his usual ardour, led him to conclude that he had found in it a substitute for copper; and his hope of success in the use of it increased with the discovery that he could, in regard to writing, accomplish his object better and more distinctly on the stone than on the copper.

It is not easy to find a way out of the ambiguities of the narrative of his experiments at this time, or to suppose that he expected to find in the stones anything but a cheap substitute for copper plates, to which, in consequence of the same difficulty of grinding and polishing the stones, which he had encountered, and to some extent overcome, in the preparation of his copper plates, he candidly admits he should in all probability have returned, though in impaired circumstances. One result, however, of his experiments upon the stone was to recall to his recollection a circumstance that had arrested his attention some years before, and which at the time he could not explain. To the recollection of this fact he attributes the invention of the present chemical lithography.

This then, brings down the narrative to the period whence the origin of the art of lithography may be dated. Senefelder tells us that he had just succeeded in his little laboratory in polishing a stone which he intended to cover with etching ground, in order to continue his exercise in writing backwards, when his mother entered the room, and

desired him to write her a bill for the washerwoman, who was waiting for the family linen. Having neither paper nor ordinary writing ink at hand, and nobody in the house to send for a supply, he wrote the particulars on the stone, with the ink he had prepared,—the composition of which, consisting of wax, soap and lamp black, he minutely describes,—intending to copy it on paper at his leisure. Some time afterwards, when about to obliterate the writing from the stone, he says that the idea all at once struck him to try what the effect of writing with his prepared ink upon the stone would be, if he were to fill in the stone with aqua fortis (thus producing the writing in relief), and whether it might not be possible to apply the ordinary printer's ink to it, and produce impressions as from a wood block. The result of his experiment with the acid was that he found the writing elevated about the 120th part of an inch above the rest of the stone, and with laudable diligence he set himself to discover the best mode of applying the ink, and procuring copies by vertical pressure. Further trials, he states, encouraged his perseverance, and were of the greatest moment to him, since this method of printing was obviously an entirely new invention, for which a patent might be obtained, if not assistance from the Government, which had already helped and encouraged inventions deemed by him of far less importance than his own.

From this period Senefelder appears to have practised his invention in his own country with his wonted ardour, and in some places with success. The great secrecy and jealousy with which the process had to be guarded, however, retarded its progress, and prevented his reaping from the discovery the fruits which he anticipated. Again, failure succeeded failure, entailing losses beyond his disposition or his power to sustain. Little surprise need be felt, therefore, that the ingenious inventor, even at this period,

was often disposed to relinquish his enterprise. Indeed it required all the encouragements of his friends generally, and the persuasions of one gentleman of influence in particular, the Director of the Academy of Arts and Sciences at Munich, to whom he had submitted his invention, to induce him to persevere. And his perseverance was at length crowned with such a measure of success as to warrant the hope that both fame and fortune awaited him.

The first application of his invention at this period was made in connexion with Mr. Gleissner, a musician of the Elector's band, who, he learnt, was about to publish some pieces of sacred music. The specimens of music and other printing, which were submitted to the musician and his wife, obtained their highest approbation, and their proposal to undertake the publication of the music on their joint account was promptly accepted. Twelve songs composed by Mr. Gleissner were copied by Mr. Senefelder on the stone, and, with the assistance of one printer, one hundred and twenty copies were produced in less than a fortnight, most satisfactorily, both in an artistic and pecuniary point of view. Through the influence of Gleissner's patron, Count Törting, a copy of this their first work was presented to the Elector, Charles Theodore, from whom they received a present of one hundred florins, with the promise of an exclusive privilege to the inventor.

Promising, however, as this beginning was (in the year 1796), the reception of a memoir of the invention by the Electoral Academy of Sciences was most disappointing. Instead of an honourable mention of it in their Transactions, which the inventor not unreasonably anticipated, he received a present of a paltry sum of money, with the intimation that the memoir had been very favourably received. A rude lever press, which the inventor had stated did not cost more than six florins, had enabled him to produce the specimens

submitted to the Society, and its Vice-president hoped that "a double compensation (twelve florins) would satisfy his expectations!" He had naturally looked for a very different result, and supposed that these guardians of science and art, whose duty it was to investigate the value of every invention, would have approved this, and submitted it to the notice of Government.

In further experiments, extending over a period of two years, Senefelder made but little progress. New and larger presses were made, and found not to answer. Engagements to print new works could not be fulfilled, and in consequence the new art lost almost all its credit and reputation; the privilege promised by the Elector when applied for was refused, and indeed could never be obtained; and not only were the inventor's little gains consumed, but debts were incurred, and the ridicule of those whom the success of his first efforts had rendered jealous was the bitter fruit of all his laborious endeavours to promote an art from which he had cherished such high expectations.

To a man of less sanguine temperament than Senefelder, there would have appeared at this time, and under these circumstances, but little inducement to prosecute his experiments. But his confidence was great; necessity led him on; and his next great improvement was considerably in advance of all the rest. Being employed to write a prayer-book on stone in the common current hand, he found so much difficulty in producing the letters reversed that he was led to trace the whole page with a black lead pencil on paper, to wet the paper, place it on the stone, and thus, by strong pressure, produce the page reversed. The experiment was not without a measure of success, but the impression was necessarily slight, and easily rubbed off.

To find a substitute for the black lead further experiments

were tried, for a time without any satisfactory results. At length, however, he succeeded in preparing a composition, with which, diluted with water, he could trace the music or letters on paper, and transfer them to the stone. This was a step considerably in advance, as it led to two ideas of great practical importance—1, that it might be possible to compose an ink which should possess the property of transferring itself to the stone, so that the drawing might be complete, and, 2, that a paper might be so prepared as that the ink with which the writing or drawing was executed on its surface might be discharged upon the stone without its retaining any part of it. To the carrying out of these two ideas his experiments were now directed. With respect to one of them, a suitable ink, he says, “I can safely assert that this circumstance alone cost me several thousand different experiments, but I was sufficiently rewarded by the final attainment of my object. Besides, these experiments led me to the discovery of the present Chemical Lithography. . . . In less than three days after my first idea, I produced as perfect and clear impressions as any that have since been obtained. Thus the new art had, in its very origin, arrived at the highest degree of perfection as to the principle, and good and experienced artists were only wanting to shew it in all the varieties of application.”

From this time it would appear that the art spread with astonishing rapidity over all Europe and other parts of the world, the only obstacle to its success arising, in the opinion of its inventor, from the imperfect instructions of ignorant artists and pretended adepts, the art of printing from stone depending entirely on chemical, and not on mechanical principles. To the general desire for a history of the art, and instructions for carrying it out, though sustained by the urgent recommendations of his friends, Senefelder for a long



time declined to respond. If sometimes disposed to accede to the general desire, he delayed, and was often deterred from his purpose, his indefatigable mind suggesting to him new improvements, calculated to render the art more perfect. Thus he was led to closer study and fresh experiments, to the complete absorption of his time and attention; so that a collection of specimens, produced in 1809, as illustrations of a work he intended to prepare, but never completed, if indeed it was ever commenced, remained unfinished, and another work, which for two years had been announced for publication by a gentleman of Offenbach, in conjunction with Senefelder, never made its appearance.

At length an inducement sufficiently strong prevailed with the inventor to attempt compliance with the general desire, and to do an act of simple justice to himself, by claiming the undoubted honour of the invention. His generous friend and patron, of whom mention has already been made, anxious to remove all uncertainty, and to prepare the way for a critical history of the new art, while it was still possible to ascertain the truth, directed the attention of M. Senefelder to certain assertions in the public prints—that Lithography had been invented in Paris, or in London; and that even in Munich, the honour of the invention would have to be shared with some one else. He also procured the insertion in a journal chiefly devoted to records of the history of industry and art, of several letters, on the subject of the newly discovered art, challenging public attention, and the correction of any of his statements which might be found inaccurate. Copies of these letters were forwarded to his friend, then at Vienna, whom he strongly urged no longer to delay the publication of a minute history of his invention, accompanied with a complete course of instructions in all its branches and modes of application. Still further to encourage the inventor, disheartened by his many unsucces-

ful undertakings, and to revive his drooping spirits, he informed him that he had introduced the subject, with particulars of the astonishing progress already made, to the notice of the Sovereign, whose patronage was promised, and to whom ultimately Senefelder's work was with permission dedicated. Indeed both the King and the Queen honoured the art with their distinguished attention, intending thereby to animate the zeal and activity of its inventor.

As might have been anticipated, Senefelder no longer hesitated, but employed his leisure hours in preparing a history of his invention, and an unreserved exposition of its different branches, enriching his account with accompanying specimens, which he ultimately published; thus presenting to the public what his distinguished eulogist does not hesitate to pronounce "one of the most interesting productions of the present time."

The work which he published is divided into two parts—  
I. The history of the invention, with particulars of its different processes. And II. a description of the manner of writing, drawing, etching, transferring, preparing, and printing from the stone. The reception of this work was flattering.

It may not be out of place here to state, that the earliest works printed from what are called "flat colour stones," notices of which have come under my observation, are the following—one, "Borders for Prayer Books," published at Munich by Strixner in 1808, and another, by the same publisher, "Les Œuvres Lithographique," brought out under the direction of Senefelder and Baron Aretin, with the date 1810. It was not until 1822 that the first application of colour printing on a large scale was made at Munich, in a work containing pictures of birds, monkeys, and turtles. An odd combination, certainly!

In 1819, the late Rudolf Ackermann, at that time a print-seller and publisher of some eminence, carrying on business in the Strand, in London, published a translation of Senefelder's German work, in a quarto volume, with the following title: "A complete course of Lithography, containing clear and explicit instructions in all the different branches of that Art; accompanied by illustrative specimens of Drawings. To which is prefixed a History of Lithography, from its origin to the present time. By Alois Senefelder, Inventor of the Art of Lithography and Chemical Printing."

How highly the publisher estimated the importance of the invention may be gathered from his advertisement prefixed to the volume. He says—"In the first place, the art itself appeared to me of the highest utility. By means of it the Painter, the Sculptor, and the Architect are enabled to hand down to posterity as many *fac-similes* of their original sketches as they please. What a wide and beneficial field is here opened to the living artist, and to future generations! The collector is enabled to multiply his originals, and the amateur the fruits of his leisure hours. The portrait painter can gratify his patrons by supplying him with as many copies as he wishes to have of a successful likeness. Men in office can obtain copies of the most important despatches or documents, without a moment's delay, and without the necessity of confiding in the fidelity of secretaries or clerks; the merchant and the man of business, to whom time is often of the most vital importance, can, in an instant, preserve what copies they may want of their accounts and tables. In short, there is scarcely any department of art or business, in which Lithography will not be found of the most extensive utility." Surely the English publisher had caught something of the spirit of the German enthusiast! For more than two years, he tells us,

he had availed himself of the knowledge of the art in the publication of various works, struggling indeed with difficulties, and frequently embarrassed from the want of definite instruction on essential points. Finding that the heavy customs duties payable on each separate print precluded the gratification of the author's wish that purchasers of the English translation of his work should receive impressions from the original stones, the illustrations which the volume contains were executed by or under the publisher's directions in London. That these illustrations, admirable as they were, would soon be surpassed, might naturally be expected ; but that the art had accomplished so much within so short a time can be best appreciated by those who are familiar with its practical difficulties, which frequently test alike the patience and the skill of the best workmen even at the present day.

One of the illustrations of Mr. Ackermann's interesting volume forms a quarto page, the dedication and the poem being written in a bold hand, very easily read, and the appended remarks in a smaller hand, very neat, the signature being in all probability the publisher's ordinary one, written with the prepared ink and transferred to the stone. It is as follows :—

“ To

“ M. ALOIS SENEFELDER, Inventor of the Art of Lithography  
and Chemical Printing.

“ E'er Art is to its full perfection brought,  
What strength of mind, what energy of thought,  
What bold Invention, what expansive power  
Blend in the Labours of the pregnant hour.  
How much, then, from a grateful Age is due  
To those who toil, Senefelder, like you !  
How great your boast, who, by your matchless skill,  
Can quicken Labour's progress at your will ;  
Can, by your chymic, multiplying powers,  
Convey to Life so many added hours ;—

And, since your potent Art began to live,  
 One Hour creates what days were wont to give.  
 Bavaria, happy to enroll your name  
 Among her fav'rite sons, partakes your fame ;  
 While her sage Sov'reign bids that fame increase,  
 And gives thee Honour, Competence, \* and Peace.

"The above lines are a Transfer, composed by and in the Hand Writing of, my Friend the Author of Dr. Syntax. — London, February 25th, 1819,

"R. ACKERMANN."

This translation of Senefelder's volume, published by Ackermann, was succeeded by "A Manual of Lithography," without date, and translated from the French work of M. Raucourt, published by Hullmandel, for which the silver medal of the Society of Arts was granted. The author remarks that the only style in which the new art has a decided superiority is that of chalk drawing. Certain of the author's observations on the imitation of wood engraving by the new art, could only refer to some of the ruder works of an early period ; nothing at all approaching the finer and more delicate productions of the present day could be produced from the stone even now.

To this Manual of Lithography succeeded a work with the names both of Hullmandel and of Ackermann on the title page as the publishers. The illustrations of this volume werè far in advance of those of Senefelder's work, and its instructions were of great practical value. It was published in 1824, in imperial octavo, under this title — "The Art of Drawing on Stone, giving a full explanation of the various styles, of the different methods to be employed to ensure success, and of the modes of correcting, as well as of the several causes of failure, by C.Hull-

\* The "competence" here referred to, which seems to have satisfied the good man, and to have "raised him above the necessity of daily toll," was a government appointment, producing £110 per annum.

mandel." The title page is a specimen of ornamental writing, very neatly executed, with a vignette above the imprint in the chalk style, about an inch and a half square; a favourable specimen of what could then be accomplished on so small a scale. There are nineteen plates, illustrative of the various processes referred to in the title page. Two of the plates illustrate the process of printing with two stones; the first of the two gives the finished picture, the other, the tint stone, shews how the whites are scraped out, the effect of a half tint being produced by the scratching of fine lines close to one another. Another illustration is a transfer from an engraving, beautifully executed by machinery on a copper plate for a work then recently published, entitled "A practical view of an invention for better protecting Bank Notes from forgery." A second illustration has transfers from two plates—the one a slightly reduced copy of a part of "Death's Door," one of the twelve masterly etchings by Schiavonetti, from drawings by William Blake, illustrative of Blair's poem of "The Grave;" the other from a small line-engraving illustration for Don Quixotte. The author apologetically observes that "the specimens given are from copper plates from which many impressions had already been taken, which were consequently worn out." It is but justice to state that the transfers are quite equal to any which could be produced by the same method at the present day. The author is indeed fully justified in saying—"Let the early productions, given four years back, be compared with what is now done, and I am certain that every impartial judge will say that the art has made gigantic strides in that short space; and that, far from having its bounds marked out, the progress that has already been made is such as to astonish, and clearly shew that a still greater degree of perfection will, and must be attained." He admits that Lithography had made greater progress in France than in

any other country, and particularly within the two years preceding the publication of his work in 1824; he concedes the great superiority of the French as far as concerns figures and heads, but thinks every unprejudiced observer will admit that in landscape we can produce finer specimens than they. I am free to confess that some of Hullmandel's works which I have seen scarcely come up to the standard of excellence which in his opinion the art had attained. A list of the Lithographic works already printed by him, and published by Ackermann, is given at the end of the volume, and serves to indicate the energy and zeal which all the new art had been cultivated, and, it may be fairly inferred, the willingness of the public to encourage it. They are fifty-five in number, some of them extending to four, six, and even ten parts; so that the retail price of a single copy of the whole series would be somewhat over fifty pounds.

The extensive application of Lithographic printing to purposes connected with the various branches of trade and commerce forms no part of my subject, otherwise it might be interesting to dwell upon it for a while. Let it suffice to say that, not merely in the great seats of manufacture, commerce and trade, but in almost every town of any size throughout the United Kingdom, the lithographic press is found side by side with the type press and printing machine, contributing extensively to the general good. It is not to its contributions to mercantile and manufacturing convenience, important as in many respects they doubtless are, but to its more attractive contributions to the growing taste of the age, which it is largely contributing its part to foster, to which your attention is invited this evening. In this connexion it has taken an important place; and not only have the affluent adorned their dwellings, or enriched their portfolios, with its beautiful productions, but the great middle classes in all our large towns have largely purchased

them. And I need hardly say that I anticipate the chief interest of my paper this evening will arise less from its details than from the specimens now exhibited in illustration of it.

Chromo-lithography is the art of printing pictures from stone. The most difficult branch of it,—that which is generally referred to when “Chromos” are spoken of,—is the art of reproducing *fac similes* of oil paintings or water-colour drawings, so closely resembling the original picture, with all its delicate gradations of tint and shade, its spirit and tone, that an unpractised eye would find considerable difficulty in distinguishing the original from the copy. Various pictures will require from the commencement various modes of treatment. The first printing may give only a very faint resemblance to the completed picture—rather a shadow than an outline; the next printing will give all the shades of another colour, and the process has to be repeated, in some instances as often as thirty times; thus giving to the picture not simply one colour in its different shades, but a hundred tints of colour, multiplied by combinations produced in the process of printing one colour over preceding ones. The mere drawing of the different parts of a picture on so many stones involves an amount of time and skill incredible to one who is not familiar with the process. A more difficult task, and one needing greater skill, is in the arrangement of the colours, which requires the knowledge of an artist combined with the printer’s practical familiarity with mechanical details. But the most difficult part of the process remains to be stated. It is what the workman designates registering, and is that part of his work which consists in so precisely placing upon the stone the sheet he is printing that it shall receive the impression where it ought to be given, because the difference



of a hair's breadth would spoil the picture by hopelessly mixing the colours.

In the reproduction of copies of water-colour drawings, passing the finished print over a grained stone, without colour, gives it the appearance of being printed on a rough paper, similar to that commonly used by the artist in his original drawing. By a similar process, a resemblance to canvas may be given to pictures reproduced from a painting in oil. In the former case the result is pleasing—the effect of the picture is heightened by it; in the latter the advantage is questionable.

In common with other modern discoveries which have arrested or attracted public attention, Chromo-lithography has had its detractors, as well as its partisans, both carrying out their feelings to an unreasonable length. Some claim for it now, as was claimed for lithography in its rudimentary state, impossible capabilities; while others disparagingly speak of it as a mere handicraft, which no skill of execution can elevate to the dignity of an art. A glance at the specimens submitted this evening will satisfy any unprejudiced mind, notwithstanding, that it is capable of producing charming pictures, immeasurably superior to the coloured engravings sometimes exhibited side by side with them in the windows of our print-sellers' shops.

The infancy of Chromo-lithography may fairly be considered as having passed by rapid strides into adolescence; while the productions of late years, and especially of the last few months, indicate the attainment of a vigorous manhood, whose works can hardly be surpassed; to which the future can scarcely do more than give greater variety, and thus be the means of diffusing a love of art, not merely among the middle and higher classes of society, but in the community generally.

In this branch of artistic printing, as in that treated of in

my former paper, a wide difference prevails, both as to the variety of style, and the degree of excellence attained. In the application of the art to the reproduction of chalk drawings, the effect of the picture is often heightened, and rendered more attractive to the eye, by the addition of one or more tints, or by one tint with the lights stopped out in the tint stone; while in the production of many pictures, six or eight stones may suffice to bring out the artist's idea. In executing the more elaborate works, from twenty to thirty stones are requisite. And it may be stated that in many of these beautiful productions any brilliancy which the artist may give to his original drawing may be equalled, and if necessary exceeded, in the printed copies. For this statement I have the authority of the Messrs. Audsley, of this town, whose elaborate work, "The Sermon on the Mount," is now before me. The frontispiece of this exquisite volume is a fair specimen of what the art could produce at the time of its publication in 1861; while the variety of the ornamentation, and the admirable register of the illuminated borders, are somewhat marvellous.

Among the productions of the Chromo-lithographic press, mention must be made of the work published under the title of "Master Pieces of Industry, Art and Sculpture, at the International Exhibition of 1862." The selection of the pictures and the description of them was entrusted to Mr. J. B. Waring, the Architect, and they were chromo-lithographed by and under the direction of Messrs. W. T. Tymms, A. Warren and G. Macculloch, from photographs supplied by the London Photographic and Stereoscopic Company, taken exclusively for the work by Mr. Stephen Thompson. This work, published by Day & Son, in whose office it was executed, consists of three volumes, each containing a hundred plates, and giving upwards of a thousand subjects. Some idea of the extent of the under-

taking may be derived from the following statistics, copied from the introduction. The time requisite to produce the three hundred plates in chromo-lithography, by one artist, would have been at least forty-two years; and the printing of the edition of the plates in their numerous colours would have occupied any one printer, working ordinary hours, one hundred and four years. Nearly three thousand lithographic stones were used for the work, and about forty tons weight of the finest quality of paper consumed. Beautiful as many of the pictures are, their chief merit is in conveying a just idea of the works of art selected for portraiture. If the statement be literally true, that three thousand stones were required to produce these illustrations, it follows that an average of ten printings would be required for each. But as many required only two or three, it follows that a large number must have required more than ten printings. There need be no hesitation in stating that the execution of the pictorial parts of these three volumes is somewhat in advance of that of the two similar volumes published in connexion with the Exhibition of 1851.

In the year 1848, a society was established in London, under the title of the Arundel Society, whose object was stated to be "to illustrate the history and monuments of art, by issuing publications of any nature and form which might be found convenient, and by forming a collection of copies, tracings, and other artistic records of important works, especially such as are not generally known." The Society consists of three classes of members—1, Subscribers; 2, Honorary Subscribers, the number of these limited to fifteen hundred; 3, Associates. Prior to 1865, the number of Subscribers was limited to fifteen hundred, the names of the Associates being introduced into the list of Subscribers as vacancies occurred. But in that year the increase in the number of Associates was so great (amounting to nearly two hundred and fifty),

that the Council convened a special meeting early in the year, which determined to recommend to the next annual meeting the enlargement of the basis of the Society's operations, by extending the advantages of subscription to a new class of members. Acting on the wishes expressed at the special meeting, the Council opened a list for Second Subscribers, in which, at the publication of the report in June, more than seven hundred persons had enrolled themselves. Accepting this as sufficient evidence of the support which the Society and the public were prepared to give to the new arrangement, the Council decided on two works, as the "Second Publications" for 1867, both of them chromo-lithographs, to be executed by Messrs Storch & Kramer, of Vienna, from Italian frescoes—one, from the subject of *Zacharias naming his son John*; the other from the allegorical figure of *Poetry*, by Raffaele, in one of the Stanzi of the Vatican. These, the Council intimate, will shew the value the subscribers may expect for their guinea. A glance at them as they are now exhibited will attest their great excellence, and the wonderful skill of those to whom the Society commits the execution of its various works. In the list of the Second Subscribers, published in September last, which had then considerably increased, appears the Liverpool Free Public Library.

That the prints issued to the second subscribers are not inferior to those which first subscribers receive, will be seen on comparing them. The two which have been issued to first subscribers for 1867 are Chromo-lithographs by the same printers, from drawings by Signor Mariannecci—one from the fresco by Ghirlandajo, in S. Maria Novello at Florence, representing the *Preaching of John the Baptist*, the other from the *Ecstasy of St. Catherine*, a fresco by Razzi, in San Domenice at Siena. In addition to these two Chromo-lithographs, first subscribers receive a line engraving

by Professor Gruner, from the tapestry designed by Raffaele, now in the Vatican Gallery, and representing the *Martyrdom of St. Stephen*.

Perhaps it ought to be stated that an entrance contribution of a guinea must be paid to the copying fund by every new subscriber.

The number of a trade publication called *The Bookseller*, for December 10, 1864, directs the attention of its readers to a work published by the Messrs. Didot, of Paris. It contains six chromos, printed by M. Kellerhoven, of that city, which, so far as the execution is concerned, may challenge comparison with any of the publications of the Arundel Society. Some idea of the excellence of these prints may be formed from the specimen submitted this evening, *The Descent from the Cross*, from the picture by Quentin Matsys, now in the museum at Antwerp. Whatever may be thought of the conception of the artist, the form of the picture, the disposition and arrangement of the figures, or the somewhat unpleasing, not to say forbidding, appearance of the principal one, there can be but one opinion as to the skill of the printer, when it is considered that there must have been from twenty to five-and-twenty printings, each from a separate stone giving a different colour.

I regret that this print was forwarded to me from Paris instead of a far more pleasing one, also a *Descent from the Cross*, by Frae Angelice de Fiesole, now in the museum at Florence, technically the most difficult of execution of the whole. It is a tryptich, being partially divided into three compartments. The centre one contains the cross, with the dead body of Christ, which is being carefully handed down. In this there are no fewer than twenty large figures, besides a background of angels over two compartments; and the writer of the paragraph states that in this picture, and in this alone, and only by the aid of a magnifying glass, had

the first Chromo-printer in London succeeded in discovering a failure. His practised eye detected, in one corner of the print, a deviation to the width of a line on the red tiles. Surely no higher praise could be awarded to the skill and attention of the printer than this. The price, too, at which these beautiful pictures may be purchased is surprising. Each separate print is sold for thirty francs, and the price of the six, bound, together with two or more pages of text descriptive of each plate, is but two hundred francs.

I submit two specimens of a work recently published in London—"Jerusalem, Bethlehem, and the Holy Places." It is completed in ten parts, each containing three prints, *fac-similes* of the beautiful water-colour drawings, painted on the spot, by Carl Werner, which were exhibited in Liverpool some three years ago. The drawings represent the most conspicuous "Holy Places" in and about Jerusalem and Bethlehem; and, through the intervention of the Prussian Consul, one or two places which had never before been represented. As, for instance, the "House of Pilate," and the interior of the "Mosque of Omar," with the large rock on which the Mussulmans believe Mahomet was raised to heaven, and which afterwards returned and placed itself on the old site. In the representation of rocky surfaces, and masses of stone work, with elaborate architectural detail, the artist's method of treatment of colour is quite his own. The brilliancy of his tints, their delicate blending, and the subtle management of light and shade, have tested the mechanical skill of the Messrs. Hanhart, by whom the views have been printed.

My attention has been directed to a series of Chromolithographs published in Boston, in the United States, but not in time to enable me to submit specimens. From a few small ones illustrative of natural history, about the size of an ordinary *carte de visite*, which I have seen, I cannot doubt

that the printer has attained a high degree of excellence; while from the vast variety advertised for sale, the conclusion may justly be arrived at that he has received corresponding encouragement.

The beautiful little Christmas and New Year's presentation cards deserve a passing notice. Many of them are gems of the art, from France and Germany, whence they are imported by London dealers in large quantities. Without positively deciding that some of the new ones brought out at the close of last year are inferior in execution to those of former years, many of which hold their place in public esteem, the fear may be expressed that a desire to compete with the best ones, and to produce them at a cheaper rate, has, in some instances at least, led to the introduction of an article produced with less labour.

In requesting the Society's acceptance of a copy of "Modern Liverpool," a work printed in my own office, for which our President of last session did me the honour to write the introduction and the descriptive letter-press, I may be pardoned the expression of a hope that, as the first work of the kind printed in Liverpool, if not in the provinces, it may not be deemed unworthy of a place among the artistic works which the Society already possesses.

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Among the specimens of early Lithography submitted to the Society this evening, not the least interesting are some which were produced in Liverpool, more than forty years ago, by two gifted young men—Samuel and George Nicholson, the sons of equally gifted parents—a family of whom it is more than probable very few present have ever heard.

Among my earliest business acquaintances in Liverpool, were these two youths, whom I employed to engrave for me

a few wood blocks ; and being in possession of some deeply, almost painfully, interesting particulars of the whole family, I am desirous of placing them on record in connection with my paper on Picture Printing, if the Council should deem it worthy of a place in the Society's Proceedings.

In the year 1806, the parents of the Nicholsons had a flourishing school for young ladies in Manchester, but the failing health of the father obliged them to relinquish it. He subsequently attempted to establish a new business as a bookseller and manufacturer of marbled paper ; but this also he was obliged to relinquish, less however from the failure of his plans than from his having unfortunately signed a bond in favour of a friend, which entailed upon him heavy pecuniary liabilities and loss.

This led to the removal of the family, which at this time consisted of the father and mother, two sons, and four daughters, and the mother's unmarried sister, a woman of sound sense and great practical wisdom ; and Liverpool was chosen as the scene of the future efforts of its head to provide for the wants of his family. Hither they came in the year 1810. With the suggestive aid of his sister-in-law, the father discovered an ingenious mode of producing stereotypes from type. This he sought to put in practice, in the hope of retrieving his fallen fortunes. With great energy and untiring diligence he addressed himself to his new occupation, and laboured beyond his strength in carrying out his discovery, having secured the patronage of more than one publisher, for whom he cast the plates of several works. Gifted with a powerful intellect, and distinguished by the strictest integrity, his expectations were sanguine ; but his new business required a somewhat large plant and expensive materials, which had to be obtained principally on credit, and, his returns falling below his expectations, he found himself so largely involved in pecuniary difficulties



that his health became enfeebled, and in the year 1814 he sank into an early grave.

To his two sons, of the ages of thirteen and twelve respectively, who seemed to have inherited their father's energy of character and self reliance, it was left to struggle with the difficulties which had fatally undermined their father's health. A friend of the family, a Printer in Halifax, having given them a commission to cast the stereotype plates of a quarto bible, these two boys might be seen in their foundry, before a glowing furnace, throughout the day and often far into the night, amply repaid for their exhaustive labour if success might but crown their efforts. The wonder is that, at their tender age, they did not fall victims to their prolonged efforts to contribute something towards the family expenses, and follow their father to the grave.

The aunt gathering together a few pupils, and the mother struggling bravely in the battle of life, and with small means keeping the house and children in admirable order, they were often, notwithstanding, in great straits for their own maintenance, and to satisfy the creditors of the departed head of the family, when a new trial came upon them, intensifying their pecuniary difficulties.

The father, himself a self-taught engraver on wood, had taught the art, along with the elements of drawing, to his two sons. One or two of their early specimens are in my possession, and have in them the promise of great excellence, had their lives been spared to cultivate the art. It was at this period of their history that the new trial to which I have just alluded occurred.

A designing man, employed as it was afterwards discovered by a large blacking-making firm in London, engaged them to engrave a label, a *fac simile* of one submitted to them. Unconsciously, they fell into the trap thus laid for them, without the slightest suspicion that they were doing

wrong, and exposing themselves to a cruel persecution. Yet so it was; and the first intimation of the fact that they had transgressed the law was received in the shape of an injunction from the Court of Chancery. Being minors when the assumed offence was committed, no further steps could be taken against them then. In the year 1822, the elder brother attained his majority, when, with a refinement of cruelty which admits of no extenuation, the young man was summoned to London—had an interview with the senior partner of the aggrieved firm—failed to convince him that he had no guilty knowledge in the transaction, and only succeeded in staying further proceedings by coming under an obligation to pay £150 as damages, and £50 as costs; which sums, in four equal payments, were ultimately discharged, at a cost of suffering which may be readily conceived.

But if the year 1822 was thus marked by calamity, it was also distinguished in other respects. By this time two of the sisters had become competent to engage in the work of tuition, and had obtained employment; thus contributing their portion to the household expenses. The mother, a woman of refined taste and artistic genius, employed herself indefatigably in copying large pictures in needle-work, with wool. These were afterwards exhibited publicly, not unfrequently, indeed, rather diminishing than contributing to the available means of the family. In the month of May of the same year (1822), Mrs. Nicholson produced her *chef d'œuvre*, a needle-work copy of Rembrandt's celebrated picture of Belshazzar's Feast, in the possession of the late Lord Derby, which his Lordship gave her permission to copy. This was exhibited in London in the course of the year; and so admirably was her task executed, that the Society of Arts awarded to Mrs. Nicholson their gold Isis medal. From July to December in the same year, this beautiful

production, and other similar ones, were exhibited in Liverpool, the proprietors of the Lyceum Library having generously granted the use of their large committee room for the purpose.

While the elder brother, Samuel, had become an expert engraver on wood, he had also successfully cultivated his taste for the Fine Arts, and in April 1821 was awarded the large silver medal of the Society of Arts for a large pencil drawing—a Composition. In the same year, also, the younger brother, George, by close attention and careful study from nature, especially in the varied character of the foliage of trees, had qualified himself to teach the art of pencil drawing to others. And it was at once an evidence of his skill and high moral character, honourable alike to patron and teacher, that among his first pupils were the female branches of the noble family at Knowsley Hall, the late Countess of Wilton, then Lady Mary Stanley, being one. Nor was it less honourable than gratifying to the rising artist that the silver Isis medal of the Society of Arts was awarded to him in this year, for a pencil drawing of Stirling Castle. This drawing was purchased from the artist by Mr., afterwards Sir Francis Chantrey; and it is a satisfactory proof of its excellence that the celebrated sculptor gave ten pounds for it. Their earliest work was published in 1821, under the title of “Twenty-six Lithographic Drawings—Views in the Vicinity of Liverpool.”\* In the Preface to this work, the artists say—“The many accidents, chemical phenomena, and unaccountable failures incident to lithographic

\* These views were—Birkenhead Priory, Hale Hut, Childwall Church, Toxteth Park, Lydiat Abbey, Dingle (Toxteth Park), Knowsley Hall, Ormakirk, Runcorn, Halton Castle, Speke Hall, Green-bank, Wavertree, Speke Hall (West Entrance), Bebington Church, Gate to St. Nicholas' Church, Otterspool, Mill (St James's), Huyton Church, Eastham Church, Knowsley Hall (South View), Hooton Hall, Woolton Ice-House, Hale Hall, Cottage in Hale Wood, Croxteth Hall, and the Frontispiece, a composition.

printing have very much retarded the appearance of our present work, and have rendered it, upon the whole, less perfect than our first anticipations led us to expect." But they give no clue to the way in which the Drawings were put upon the stone, whether directly or by the use of transfer paper. If the latter, they were in all probability produced by the pen, their appearance being that of pen and ink drawings, somewhat tame, indeed, when compared with etchings from copper, which they resemble more nearly than their subsequent works, all of which appear to be in the chalk style.

In the year 1824, the Messrs. Nicholson published a quarto volume—"Plâs Newydd, and Vale Crucis Abbey, correctly drawn from nature, and engraved, by S. & G. Nicholson." These are etchings, six in number; and there are three beautiful specimens of wood engraving executed by them—one on the cover of the work, another on the title page, and the third, a view of "Llangollen Church, as seen through a compartment (a circular one) of the library window," exquisitely engraved.

In January of the following year, 1825, an event of the most painful character occurred, which, to use the language of one of the surviving sisters, "deprived the family of its head—a most generous and loving brother—a most noble heart—a most valuable earthly friend. In the family journal, the sad trial is recorded by his mother and brother, in words which stir the heart, and bring tears to the eyes." In defending his mother from the fierce attack of a rabid dog, he himself was bitten, and died shortly afterwards in frightful sufferings from hydrophobia.

As may be supposed, the sad event produced deep depression upon the spirits of the survivors, especially upon the remaining brother, thus awfully deprived of a dear companion and a loving and faithful friend. But the loss the family

had again sustained only tended to bind the hearts of its surviving members more closely together. The elastic spirit of the brother rose again, and he addressed himself to labour with redoubled ardour. Taking his youngest sister under his tutelage and companionship, he taught her flower drawing, associated her with him in his engagements as a teacher, and together they won their way to public esteem and confidence, alike by their high morality and their unceasing industry.

Having liquidated all his father's liabilities, though sometimes compelled with great reluctance to leave some of his own unpaid, George had the fair prospect of discharging these also, and of winning a respectable competency for himself and those doubly dear to him,—for whose sake he had remained unmarried,—when, in the year 1838, the combined effects of an attack of cholera and influenza, producing consumption, carried him rapidly to the grave, beloved and lamented by a wide circle of admiring friends. Two of the sisters still survive; the water-colour drawings by the younger (who is also the youngest member of the family) are highly prized.

It was during the most critical period of the life of these gifted young men, and a short time before the death of the elder brother, that the views in Carnarvonshire were executed. They were published under the patronage of the two titled ladies, who for so many years, by the singularity of their costume and other eccentricities, attracted the attention of visitors to North Wales—the Lady Eleanor Butler and the Hon. Miss Ponsonby, of Plas Newydd, near Llangollen. The sketches for this work, and the etching on copper, were made by the two brothers, who were contemplating the publication of a second series, to be executed in the same way, when their attention was directed to Lithography, then recently invented and introduced into this country. A con-

sideration of the capabilities of the new art, and a series of trials having led them to the conclusion that it offered more scope for their style of drawing, which was daily becoming more free and masterly, they soon felt confidence in their ability to produce works worthy of public approbation and support, and all their future efforts in publication were confined to chalk drawings upon the stone.

The second series above alluded to,—“Eight Select Views, in the County of Caernarvon, drawn from nature and on stone, by George Nicholson, and printed by Charles Hullmandel,”—is without date. But it is more than probable that it is to this publication a circular refers, dated July, 1827, from which the following is an extract: “In submitting this work to my friends, I feel aware that there is much occasion for requesting their indulgence, both on account of its having been so long delayed, and for now producing it executed in a different manner from that in which it was expected to appear. A variety of circumstances, too painful to repeat, having prevented me from engraving my plates on copper, and the art of Lithography having attained a degree of perfection, which gives the character of nature with as much certainty as in the original drawing, I have thought it advisable to avail myself of it, and hope my friends, who favoured me with their support, will be satisfied with the manner in which they are executed.”\* The plates in this volume are in imitation of fine Chalk Drawings. The impressions in the copy before me are printed on India paper.

Subsequently to these, George executed in the same style several drawing books for learners, some of which are in my possession. The great excellence which he attained in

\* These views are—Conway, Llanberis Vale, Snowdon, Nant Frangon, Llyn Idwal, Tŵll Dû, Rhaiadryr ir Ogwen, and Pont y Menai. A beautiful emblematic Inscription, to the Countess of Derby, precedes the views.

the execution of these works on stone arose, doubtless, from the increasing pleasure which he experienced in the new mode of producing them, the medium admirably admitting the reproduction of the freest strokes of his pencil, and drawing on stone being more congenial to his taste than etching on copper. The earlier ones, were printed by Hullmandel, the later ones by Day.

As a series of impressions, illustrative of the method pursued in the production of a Chromo picture, would much more clearly explain the process than any mere description, such a series is here presented.

An ordinary tinted Lithograph, for which three or four printings only would be required, might have sufficed for this purpose, but, in order to encourage the obviously growing taste of the day, something more elaborate has been produced — a *fac-simile* of a water-colour drawing. A young Liverpool Artist, of great promise, Mr. H. B. Roberts, whose works find ready purchasers, has prepared a drawing which it is hoped will be acceptable to those who take an interest in such matters; to whom it may be satisfactory to know that the artist has kindly put upon the stone so much of the picture as was necessary to furnish a key for the whole; that is, the stone to impressions from which all the impressions from the other stones must be adjusted. But though it is indispensable that this key-stone shall be first prepared, it does not follow that it must be first printed from — it is usually the last.

The following extract from a *Memoir of Lithography*, quoted in the preface to one of the works published by the brothers Nicholson, the date of which is 1821, will explain the process, so far as a single printing is concerned; and it is only necessary to state that the more elaborate works are produced by repeating the same process for each of the colours introduced :

“Lithography is founded on mutual and chemical affinities, which hitherto have never been applied to the art of Engraving. The dislike which water has for all fat bodies, and the affinity which compact calcareous stones have for both water and greasy substances, are the basis on which rests this new and highly-interesting discovery. The art of Lithography may be divided into two parts; the first consists in the execution of the Drawing, on a stone which has been made perfectly smooth and level, with an ink composed of greasy materials, in the same way as one would execute a drawing on paper with common ink. The second consists in obtaining impressions from the stone. To obtain these impressions, the printer wets the whole surface of the stone; but as the greasy ink which constitutes the drawing has a natural aversion for water, those parts of the stone alone which are not covered with the ink imbibe it. The printer, while the stone is still wet, passes a thick and greasy ink over its whole surface; and the lines of the drawing receive the ink, while the wet surface of the stone refuses to take it. A sheet of paper is now strongly pressed on the stone, which, receiving the printing ink that has been applied to the drawing, gives a reversed *fac-simile* of the original one. The stone is wetted afresh, and afresh charged with ink, and thus a series of impressions are obtained.”

It may be stated that the plan here described is, with but little variation in some minor respects, that which is followed at the present day.





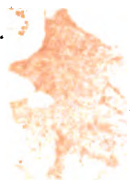








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## FIRE, AND FIRE-MAKING: A CHAPTER IN THE HISTORY OF CIVILISATION.

By JOHN NEWTON, M.R.C.S.

“FUSEES, only a ha’penny a box!” “Vesuvians, three boxes for a penny!” I am afraid that I have chosen a very vulgar subject, of which we all hear too much. The means of fire-making in this year of our Lord, 1867, are only too facile and abundant. Ladies tread upon lucifers, and set their dresses on fire. The smoker’s match carelessly thrown away has become a social nuisance, the great source of conflagrations now-a-days. One Insurance Company has lately reported that its losses from fires caused by lucifer matches alone amount to not less than £10,000 annually! In this complex civilisation of ours, we are surrounded from our birth—rich and poor alike—with social aids, refinements, and luxuries innumerable. Every one of these things has a history, and had a beginning. And I know no better way of realising to oneself the enormous progress which has been made by the most advanced races of mankind than to take some one of our great social needs and write its story.

About eighteen hundred years ago, Plutarch wrote an essay on the theme, Which was the more useful to man, water or fire? “*Aqua aut Ignis utilior?*” The question would be infinitely more difficult to answer now. Yet there was a time, strange to say, when the use of fire, even in the humblest way, as ministering to social comfort and human protection, was unknown. Men saw the lightning fill the heavens with its brightness, and fire the pines of the forest, yet were ignorant of any method by which they could make it subservient to



their daily needs. No wonder that the ancient Greek writers, as Æschylus and Diodorus, vividly realising the ignorance of primitive humanity, described the fathers of our race as the most weak and helpless creatures imaginable, like the famous Egyptian frogs, only half developed from the primæval slime. It must certainly be conceded that man, without arms or arts, must have been the most helpless of animals, since he alone is thrust naked into the world, unprovided with one single weapon of defence. If in his infancy of knowledge he had been forced to contend against the myriads of wild beasts, and the long winters of a cold northern clime, he could not have held his own in the struggle for bare existence, far less have made any social progress. His first home, then, must have been in some sunny eastern land, where bleak winter was almost unknown, where the trees were never without leaves or fruit, where shelter and clothing, storehouse and barn would be little needed, where the earth yielded abundant increase without tillage, and where the sheep and the goat offered themselves as passive subjects for man. Such then must have been the cradle ground of the human race; until, their faculties strengthened by exercise, and their experience of natural things enlarged, they were fitted to go forth into new climes and strange regions, to commence the colonisation of the world. To this conclusion, indeed, the whole stream of ancient history and tradition tends; while the recent study of comparative grammar and antiquities has furnished overwhelming new proofs, that in Central Asia, by the banks of the Euphrates or of the Indus, the earliest forms of civilisation, of language and the arts took their rise.

Who, then, was the first man that discovered a practicable mode of making a fire? A discovery so great, that in comparison with him, Watt and Faraday and Wheatstone were but the inventors of toys. If we refer to the Book of Genesis,

which embodies the earliest traditions of the ancient Hebrews, not a word on so interesting a subject is to be found. Though artificial fires are continually mentioned or understood, there is not one word either in the earlier or later Hebrew books as to how they were kindled. The ancient Greek and Roman literature will supply us with more definite information. Thus, the Greeks fabled that Prometheus, a god, the friend of man, pitying his forlorn condition, stole the sacred fire from Zeus (or Jove), and brought it as a gift from heaven to earth. Such is the legend as given by Hesiod (800 B. C.) Æschylus (484 B. C.), in his tragedy of *Prometheus Vincit*, represents Prometheus as speaking thus :—

The secret fount of fire  
I sought, and found, and in a reed conveyed it,  
Whence arts have sprung to man, and life hath drawn  
Rich store of comforts.

For which benevolent theft, he was chained to a cold craggy rock in the wastes of European Scythia. Cicero says (*Tusc. Quest. ii. 10*) that he stole the fire from the volcano of Lemnos, which was itself supernaturally kindled. The Latin poet, Lucretius, as an epicurean philosopher eschews all miracles, and ingeniously conjectures that fire might have been derived by men—first, from a conflagration produced by lightning, afterwards from observing the effects of friction on dry wood. The passage is worth quoting :—

Illud in his rebus tacitus ne forte requiras,  
Fulmen detulit in terram mortalibus ignem  
Primitus, inde omnis flammæ diditur ardor.  
Multa videmus enim cælestibus inlita flammis  
Fulgere, cum cæli donavit plaga vapore.  
Et ramosa tamen cum ventis pulsa vacillans  
Aestuat in ramos incumbens arboris arbor,  
Exprimitur validis extritibus viribus ignis

Et micat interdum flammai fervidus ardor,  
 Mutua dum inter se rami stirpesque teruntur.  
 Quorum utrumque dedisse potest mortalibus ignem.  
 Inde cibum coquere ac flammae mollire vapore  
 Sol docuit, quoniam mitescere multa videbant  
 Verberibus radiorum atque aestu victa per agros.

F. Lucreti Cari, *De Rerum Natura*, v. 1091—1104.

“Lest, on these things, you ask in silent thought this question:—it was lightning that brought fire down on earth for mortals in the beginning; whence the whole heat of flames is spread abroad. For we see many things shine inwrapped in heavenly flames, when the stroke from heaven has given to them its heat. And again, when a branching tree sways to and fro under the buffetings of the winds, pressing against the boughs of another tree, fire is forced out by the power of the violent friction, and sometimes the burning heat of flame flashes out, the boughs and stems rubbing against each other. Either of these (accidents) may have given fire to men. Next the sun taught them to cook food and soften it with the heat of flame, since they would see many things grow mellow, subdued by the strokes of the rays, and by heat throughout the fields.” Lucretius evidently believed that the most ancient artificial method of obtaining fire was by rubbing two pieces of dry wood together. And there is no reason to doubt, as we shall see, that he was correct. In the Homeric Hymns (Merc. iii.), written perhaps eight hundred years before the Christian era, this primitive invention is ascribed to the god Hermes. The word *πῦρσιον*, mostly found in the plural form, means (Liddell and Scott in voc.) “pieces of wood, one of which was rubbed against another until they caught fire.” Fire-sticks, as we should say, like the Latin *igniaria*. “The stationary piece was called *εσχάρα*, the piece turned rapidly round *τρύπανον*. Theophrastus, *Ign.* 64.” This writer lived three hundred and twenty-two years

before Christ. Plato (400 B. C.) has this allusion in his *Republic*: "And perhaps by considering the two cases side by side, and rubbing them together, we may cause justice to flash out from the contact, like fire (*ἐκ πυρίων*) from the fire-sticks."

Such then are the earliest notices to be found in ancient literature of primitive fire-making. But the literature of ancient Greece is comparatively a thing of yesterday, when contrasted with the antiquity of the human race. For the art of writing is a modern invention which came in with the iron age. The Homeric Hymns did not exist three thousand years ago, whilst the flint implements which have been found associated with the remains of the mammoth and other extinct animals in the alluvial gravels of France and Southern England, are considered by Sir Charles Lyell and other geologists as proving the existence of the human race in these lands a hundred thousand years ago. That we may be enabled to grasp, though but feebly, this long dim unhistoric past of our race, let us enumerate briefly the great epochs into which it has been divided.

First, the Palæolithic or Earliest Stone age. The most ancient remains of man yet discovered are probably the large flint tools and weapons (spear heads, knives, and grubbers), found in undisturbed seams of gravel, at depths of ten to thirty feet below the surface, at St. Acheul, near Amiens, and other places in the north of France, and also in the south of England. No trace of pottery or metal has been found with them. They are associated with remains of the mammoth, the woolly-haired rhinoceros, the urus, and other extinct animals. These implements are never polished, and no worked or polished stones, such as stone hammers or clubs, have been discovered with them. Somewhat more recent are the remains found in caves, as at Dordogne, Gibraltar, and elsewhere. These contain also

worked flints, with tools of horn and bone, but no polished stone implement, nor any trace of metal. They seem to have been made by a small race, like the Esquimaux, whose principal food was the reindeer, from which this has been called the reindeer period. The bone implements are often highly polished, and rudely carved. Drawings of reindeer, and of a mammoth, have been found upon them. *Associated with these remains, burnt charcoal, and other proofs of the use of fire, have been frequently found.*

Second, the Neo-lithic, or Later Stone Age. Polished stone axes and perforated hammers, with hand-made pottery, distinguish these remains, which are found associated with bones of still existing animals only, such as the ox, sheep, pig, goat and dog. Agriculture had begun. Flax was cultivated and woven into tissues. These remains are never found in the river-drift gravel beds, nor associated with the extinct mammalia. Abundant evidence of the use of fire is found, but the use of metals was still quite unknown. The earliest Swiss lake-dwellings and the Danish shell-mounds belong to this period. Some of the sepulchral tumuli are of this age, in which flint daggers and highly wrought stone axes, bone, amber and jet ornaments, but no metals, have been deposited with the deceased. In burials of this age, the corpse was often deposited in a sitting position within a stone cyst, or it was burned.

Third, the Bronze Age. To the age of stone succeeded a time when copper, and still later its compound with tin, bronze, was extensively used for tools and weapons, the earliest implements being copies of the more primitive stone ones. Many of the Swiss Lake Villages, and the tumuli and barrow-graves, belong to this period. The pottery was still made by hand, but much better, larger, and rudely ornamented. There was a considerable com-

merce. Gold, amber, and glass were used for ornaments. But coins and the art of writing were still probably unknown, as also were the other principal metals, silver, zinc, lead and iron.

Fourth, the Iron Age. This metal was now first used for cutting instruments and weapons, though bronze continued to be much employed. Silver now appears, chiefly for ornaments, and coins began to be used. The art of writing was discovered, and the historic period commenced. It may serve to shew the great antiquity of even the iron age in the east, the birth-place of mankind, if we recal that iron clamps are occasionally found within the great pyramid of Ghizeh, which, according to the most moderate recent estimates, are at least four thousand years old. It is worth noting here that in the book of Genesis (iv. 22), Moses describes Tubal-cain, of the fourth generation from Adam, as an instructor of every artificer in brass, (copper) and iron. A proof, surely, that this book was written long after the commencement of the iron age in the east, when the previous phases of civilisation had faded from the memories and the traditions of mankind. The iron age of civilisation had not reached these shores when Cæsar landed in Britain (B. C. 55), though the races whom he encountered were armed with bronze weapons, and used coins.

Thus have we taken a rapid survey of the various stages through which the human race appears to have passed, and have found that the very earliest who left any enduring monument were fire-makers. Is it possible, in the absence of all history or literature, to discover what methods they used? Most assuredly it is. For every phase of civil culture may be studied yet in living examples; that which was but a temporary condition of the more highly endowed races, continuing longer permanent in others. Nay, we may discover tribes more primitive in their mode of life than the

earliest of those who have left any trace behind in the region of antiquities. For the fashioning of stones and flints to form a hundred useful tools and weapons, as knives, wedges, pikes, and arrow-heads, demands much dexterity, and bespeaks a certain advanced cultivation. But the natives of Australia and of Terra del Fuego, are many grades below this. Thus, Captain Cook, describing the aborigines of Van Diemens Land in 1771, says, the natives whom he saw were quite unclad, except with a piece of Kangaroo skin, just as stripped from the animal, which, if scanty, they hung on that side of their bodies towards which the wind blew. Their only weapon was a hard straight stick, sharpened at the end, their only cutting instrument a shell. Their houses were holes in the ground, covered with sticks, or hollow trees; their principal food small birds and shell-fish, heaps of shells being found about their rude hovels. Yet even these wretched beings knew how to obtain fire, which they did by rubbing together two pieces of dry wood. The process, however, being one involving considerable labour, particularly in damp weather, great care was taken to prevent the fire, when once lighted, from becoming extinguished. For this reason they often carried with them a cone of banksia, which burns slowly like amadou. Thus then, we have traced fire-making to its lowest method; which way, as Lucretius guessed, had been suggested by observing the accidental effects of friction on wood, especially in tropical countries. Thus in Borneo and Sumatra, they are often able to obtain sparks by simply striking together two pieces of split bamboo. In the South Sea Islands, they obtain fire by rapidly rubbing to and fro a blunt-pointed stick along a groove of its own making, in a piece of wood lying on the ground. But this "stick and groove" process is not practised in any other region. Another mode, which may be called the "fire-drill," is the one still universally practised by many tribes of men

all over the world. It is so well described by our late honorary Secretary, Dr. Collingwood, in his *Rambles of a Naturalist*, as he saw it in Borneo, that I cannot do better than copy his description, (p. 228.)

“A heavy shower of rain having driven us to the shelter of our huts, we sat and amused ourselves with chatting with the good-natured Malays who accompanied us. My request that they would make fire was answered by one of the Malays selecting from among our fire-wood a dry stick, of hardish wood, about fifteen inches long, which he cut into the form of a thickish lath, and having also made a small notch on the narrow edge, stick number one was ready for use. Taking a smaller piece of wood of the same kind, about nine inches long, he pared it into a cylindrical shape, and cut one end straight off. Then placing the long stick on the ground with the flat side uppermost, and setting his feet firmly upon the two ends, he put a piece of paper under the notch, and taking the small stick between both hands, as he squatted before it, adjusted the flat end to the smoothed surface of the larger stick immediately adjacent to the notch. He then rotated the small stick rapidly between his hands, pressing it down upon the larger one, until by degrees a round hole was formed, and a ligneous powder was produced, which fell down the notch, and formed a little heap upon the paper. After having thus rubbed for about two minutes, the powder began to smoke, and then turning black, as the increasing heat charred it, suddenly became red hot, and the tinder thus formed only required a puff of breath at this critical moment to ignite the paper beneath. The exertion required was considerable, but of short duration.”

The geographical range of this simple method is immense. It continues still to be used, by tribes who have long been acquainted with the flint and steel, as by the Dyaks in Borneo, and the Russians in Kamschatka; many carrying flint



and steel in their pouches, whilst others still carry the fire-stick. It is so handy, and the materials for practising it are so universally to be met with, that if it were not for the special knack, education one might say, needed for success, this method of fire-making would still be a great boon to many a belated traveller and shipwrecked mariner. Sir S. Baker, in his *Nile Tributaries of Abyssinia*, p. 541, describes vividly the method as he saw it practised amongst the Arabs; and then adds, "although in Arab hands the making of fire appears exceedingly simple, I have never been able to effect it. I have worked at the two sticks until they have been smoking, and I have been steaming, with my hands blistered, but I have never got beyond the smoke." And Mr. Galton, in his capital book, *Art of Travel*, candidly acknowledges that though he had made many attempts, he had been equally unsuccessful. Some tribes have been met with who had advanced a stage, and instead of rotating the upright stick with the hands alone, they used a cord passed round it, or the drill-bow, by which means they obtained rapid rotation with less labour. There is a distinct reference to this method of assisting rotation in Homer's *Odyssey*, ix. 382. That the wooden friction apparatus is the most ancient of all methods of fire-making is further curiously established, by its constant association with the mysteries of a "sacred fire" in all countries and all ages. Thus, among the ancient Romans, from the earliest times, a perpetual fire was maintained in the temple of Vesta, and certain virgins, chosen from the noblest families, watched the sacred flame night and day. If by any neglect the fire became extinguished, which was looked upon as a great calamity, it could not be relighted from any ordinary fire, since that was considered impure. Festus expressly tells us that the Vestal virgins were in such a case punished by scourging; and the high-priest made pure fire anew by drilling into a board of

auspicious wood until fire came. To this day the Brahmins rekindle the sacrificial fire by drilling one piece of arani wood into another. In the ancient Sanscrit, the name of the upright stick or spindle is *pramantha*, which seems to recall the Aryan legend of Prometheus, the fire-maker. Sun-worship in some form or other is to be found in almost every ancient faith. And in honour of the sun-god, a perpetual fire was kept up as his emblem. It has lingered amongst us, in some form or other, even to the present day. Perpetual fire was maintained in a small cell near the church of Kildare, even down to the suppression of the monasteries. It was kept up by virgins of high rank, who were called *inghean an dagha*, or daughters of the fire. Relics of this Baal-worship are to be found still in the bonfires lighted on midsummer eve, round which the people dance, and then finish by jumping through the flames. The need-fire as it is called among us, or *nöthfeuer* as the Germans call it, which is supposed to purify all those who pass through it from diseases, is evidently of the same origin, and this fire is always kindled by the friction of two pieces of wood. Miss Martineau, only two years ago, thus described this curious superstition as still existing in Cumberland:—"In the pastoral valleys, the trouble occurs now and then that the milk will not churn. Elsewhere the causes of this are understood, and cow and milk are treated accordingly. Not so here. The cow is at once concluded to be bewitched; and it is apprehended that she will spread the witchery to the whole dairy. So, instead of any sensible method, the remedy tried is depositing in the cow-house some soil from the nearest churchyard. As it is probable that this fails, time is lost in other proceedings. Stirring with a stick from the rowan tree is one of the least troublesome. If the cows are dis-tempered, it is actually a practice in many of the dales to light 'the need-fire,' notice being given throughout the

neighbouring valleys that the charm may be sent for if wanted. *The need-fire is produced by rubbing two sticks together.* A great pile of combustible stuff is prepared, and the more smoke it can be made to give the better. When lighted, the neighbours snatch some of the fire to hurry home with, and light their respective piles. The cattle, diseased and sound, are then driven through the fire; as some of the Irish, by a remnant of paganism, charm their property, and even their children, by passing or snatching them through the fire. It is said, in a certain Cumberland dale, that when a farmer had driven all his live property through, he proceeded to drive his wife after the cows, saying he should then be freed from all distempers."

Thus do we see the most ancient method of fire-making embalmed in old superstitions, some relics of which have survived even to our day, like straws that have floated down the stream of time.

The next stage in fire-making was the discovery that many hard minerals on being struck with a flint elicit sparks. This method was well known to the ancient Greeks, and they called such minerals *πῦρίτης, πυρίτης λίθος*, the fire-stone. These were ores of copper and iron. Nodules of iron ore, which had evidently been used as strike-lights, were found amongst the remains of some Swiss lake-dwellings of the Bronze age; which may well be, according to M. Morlot's estimate, four thousand years old. This method of obtaining fire, where suitable minerals can be obtained, is much easier than the fire-stick, and is a great advance over that method. Both modes are practised by the same tribes in many parts of the world. Some tribes of Esquimaux practise this method alone, for wood is unknown to them. With the advent of the Iron age, the flint and steel would soon come into use. But I have only found one passage in any early Greek or Latin writer

distinctly referring to it. They appear rather to describe the second method, the flint and pyrites. Thus Sophocles (B. C. 468) represents Philoctetes as telling how he obtained fire :—

. . . εἶτα πῦρ ἂν οὐ παρῆν  
ἀλλ' ἐν πέτροισι πέτρον ἐκτρίβων, μόλις  
ἔφην' ἄφαντον φῶς, ὃ καὶ σωζει μ' αἴει.

Fire there was none, but, striking stone with stone,  
I drew the latent spark, that warms me still,  
And still revives.

Virgil, in his *Georgics*, i. 135, mentions amongst other things which Jupiter taught men, the mode of obtaining fire from the flint stone :—

Ut silicis venis abstrusum excuderet ignem.  
And force the veins of clashing flint t' expire  
The lurking seeds of their celestial fire.

DRYDEN.

Again, in the *Æneid*, i. 174, on the landing of Æneas after the shipwreck :—

Ac primum silici scintillam excudit Achates  
Suscepitque ignem foliis, atque arida circum  
Nutrimenta dedit, rapuitque in fomite flammam.

At once Achates struck a spark from flint,  
Received the fire in leaves, placed round the heap  
Dry twigs and moss, and fanned them into flame.

In the following passage, Lucretius (40 B. C.) distinctly alludes to both methods :—

seu lapidem si  
Percutiat lapis aut ferrum ; nam tum quoque lumen  
Exilit, et claras scintillas dissipat ignis.

*De Rerum Natura*, vi. 161.

“Just as if a stone were to strike stone, or iron, for then too light bursts out, and fire scatters about bright sparks.”

We may therefore safely infer that before the Christian era the flint and steel were well known. I have not been able to find one word on this curious subject in any Dictionary of Antiquities.

And so for two thousand years certainly flint and steel have been in use, down to our own day, having displaced throughout Europe the more primitive methods. Forty years ago, not a house, I suppose, could be found in England without its tinder box, and now it has disappeared utterly, and passed into the region of antiquities! I have had much difficulty in procuring the two specimens exhibited. The one, a very primitive wooden affair, was found by a relative in a Wiltshire cottage, the other is the form that I remember having seen in constant use. It is simply a circular box, with a handle; the lid having a socket for a candle in the centre of it. On the bottom of the box, the tinder was placed, over which a false lid dropped, and upon this inner lid were placed the flint and steel. The latter was made in many shapes, that of a diminutive horse-shoe, and of a stirrup, were the commonest. How well do I remember the laborious details of fire-making when I was a child! The ancient house, and the old oak furniture, and the diamond windows accorded well with the primitive rite. Every week rags were burned afresh to supply the tinder box, which stood handy by the kitchen fire, not the least important article of furniture. Curiously did I watch the servant, on a cold dark winter's morning, striving to set the tinder a-light. Perhaps it had become damp, not having been recently prepared, for it readily attracted moisture. Then it was almost in vain that she sent spark after spark from the steel upon it. Not one would catch. If so, there was nothing for it, but to sally out with the lantern, and bring back the initiatory fire from some neighbour's hearth. Or the passing watchman supplied it from his great horn lantern. Usually, however, the

tinder easily caught. Then she brought forth a huge bunch of clumsy matches tipped with sulphur. One of these, applied to the spark in the tinder, stimulated by a puff, took flame. A candle being forthwith lighted, the difficulty had ceased. Nevertheless the process was so troublesome, and so uncertain, that it was usually avoided in the districts where coal is cheap, by keeping up the kitchen fire night and day. This fire having burned low before the family retired for the night, a long piece of coal was selected, and this "raking coal" was stuck down into the still burning embers; the slack was heaped around to keep all quiet, and thus it was left. In the morning, the servant had only to break the big coal, already well a-light at its lower end, and the kitchen fire, the stock fire, was made. The traveller usually carried about with him an iron box, having inside a flint, and a bit of singed wick, with which he laboriously strove to get a spark for his pipe.

I found this summer that the peasants and guides in Switzerland were still using the same method. Amadou is used by them for tinder, over which, however, it has no advantage. A pretty little gilt box, having a stout rim of steel, is still sold at the tobacconists' shops here. It is preferred by old sea-captains, and has a piece of agate, which is said to give a hotter spark than flint. This is the only form of the old flint and steel that is now to be seen. During the present century, several attempts were made to render the process easier. One form was a kind of flint-lock pistol, without a barrel. In lieu whereof, the sparks fell into a little box, containing tinder. I possess a pistol tinder-box, and it certainly was an improvement.

Other methods for obtaining fire of considerable antiquity have been occasionally used. Such as the burning lens or mirror, which, by concentrating the sun's rays, would give heat enough to inflame dry moss or wood. This appears to

have been known in Greece two thousand two hundred years ago, as it is mentioned by Aristophanes. Blacksmiths in country districts have often lighted their forges by hammering a bit of iron sharply on the anvil, until it became very hot, then dipping it into brimstone or charcoal. But such methods are of no importance since they can only be of very partial use.

M. Dobereiner, a German chemist, invented a most ingenious fire-producer. This consisted of a little apparatus for generating hydrogen gas, which is readily inflamed by coming into contact in the air, with spongy platinum. It was only necessary to turn the tap, a jet of the gas blew on a little platinum ball, which became red-hot in a few seconds. The gas caught fire, and a light could be at once procured by a little paper spill. At one time, 1830-40, these Dobereiner's lamps were much used. They are both elegant and efficient, but not portable, and the first cost is considerable. They have quite disappeared from daily use, and are only to be seen in the laboratory of the chemist, or in some old curiosity shop.

Another method, which came into use about the same time, depended for its success on utilising the heat developed during the rapid condensation of air. Into a brass cylinder was fitted a solid piston, having a bit of German tinder in the end of it. When this piston was rapidly thrust down, sufficient heat was sometimes developed to fire the tinder.

About the same time, or a little earlier, a kind of lucifer match was first invented. It had been known for some years that if a mixture be made of chlorate of potash (potassic chlorate), with sulphur and sugar, it will burst into flame on the addition of sulphuric acid. Advantage was taken of this by coating the ends of small wooden or pasteboard matches with the mixture, rendered adherent by glue or gum water, which would immediately inflame on being dipped into sulphuric acid.

Thirty years ago this match came greatly into use. Little pasteboard boxes, containing fifty matches, with a small bottle of sulphuric acid (prevented from spilling by a little asbestos), were sold for threepence to sixpence. Of course the bottle was a great nuisance. Sometimes the acid got on to the clothes. Besides, it was difficult to find the mouth of the bottle in the dark, and the fingers might be burned in doing so. Phosphorus matches then began to appear, and it is strange they had not done so before. This extraordinary substance had been known to chemists ever since 1669, in which year it was discovered by Brandt, an alchemist. It is manufactured from bones, also from guano, both of which substances consist principally of lime united with phosphorus (calcic phosphate); and so enormous is the demand for it, that nearly 400,000 lbs. of it are said to be yearly produced by the English and French manufacturers alone, nearly all of which is consumed in making lucifer matches. It inflames so readily upon contact with the air, that it is obliged to be kept under water. Some forty years ago, phosphorus bottles, as they were called, began to be used. A bit of phosphorus was put into the bottle, and if a sulphur match was pressed against the phosphorus, so as to detach a particle of it, then rubbed quickly against the cork, the match would be inflamed. These were called in France "briquets phosphoriques." Phosphorus was also melted with some yellow wax, and cork raspings added. This mixture would inflame a sulphur match dipped into it. The next step was to coat small sulphur matches with a mixture of this kind. Little boxes of them were sold under the names of "Patent Hyperæans," "Prometheans," "Congreves," &c. &c. A tiny portfolio of sandpaper was found in each box, and the match, drawn rapidly between the compressed leaves, burst into flames. A friend tells me that he once gave half-a-crown for one of these small boxes. They were sold at



the opticians'. The modern lucifer is usually a sulphur match, coated with a composition containing a little phosphorus. The mixture for this second coating may be thus made. Phosphorus, 4 parts; nitre, 10; glue, 6; red lead, 5; smalt, 2; the glue is liquefied with water into a jelly, and whilst kept hot, the phosphorus is added. It liquefies and is readily diffused through the glue. Then the nitre and the colouring matters are added in powder. These phosphorus matches soon became popular, and as no one claimed the discovery or patented it, many persons rushed into the trade, who carried it on in small houses, insufficiently ventilated. A very large proportion of phosphorus was at first considered essential for the dipping mixture. And it was soon discovered that the phosphorus fumes, continually inhaled, produced a most dreadful disease in the bones of the face; the teeth dropped out, and large portions of bone, especially from the under jaw, died and separated from the body. This frightful disease is called phosphorus necrosis. In England the manufacture is now carried on exclusively in certain large manufactories, and the proportion of phosphorus has gradually been reduced to one or two per cent. only in the dipping mixture, the gratifying effect of which has been to render the disease almost unknown here, though in France it is still frequently met with.

There is one of these manufactories in Liverpool, that of Mr. Martindale, which I was courteously allowed to inspect. Perhaps a short account of what I saw may not be uninteresting. The place at first looks like a great timber yard, surrounded by a long line of low buildings which look like joiners' shops. Wood is the great material wanted, both for the matches and also for the boxes. The first process, then, is to cut from the plank across the grain, pieces  $4\frac{1}{8}$  inches long, that being the length of two matches; this is rapidly done by means of a circular saw, worked by steam power.

These pieces, about the size of large bricks, are then taken to the match cutting machine; one of them, held in a kind of vice, is presented to a row of lance-like points, which rapidly pass across the wood, making a series of parallel cuts the width of a match asunder; a circular knife then descends across the scored face of the block, cutting off a long row of matches, each  $4\frac{1}{2}$  inches long. These are rapidly gathered up in baskets, and thrown in heaps before a man, whose duty it is to pack them into bundles, containing about five hundred each. This he does with great adroitness. He takes up a handful, shakes it, arranges the matches all parallel, and fills with them a semi-circular box, across which a piece of string has first been laid. This is at once tied tightly around them, and the bundle is finished. I was told that, with this simple string-box, he could make forty bundles an hour. These bundles are then transferred to a drying-room, kept very hot, where they are stacked on shelves of stout iron wire, just as wine bottles are held by the metallic wine bins. It has been found that sulphur adheres much better to wood thoroughly dried and hot. When the bundles are ready, they are taken to receive their coating of sulphur. This is kept melted for the purpose in a large shallow iron pan, placed over a hot air flue. The workman takes a bundle of the splints, gives it a slight knock on a flat iron table, to secure the ends being quite level, and then dips them a very slight way into the sulphur bath, he then repeats the process with the other end. The bundle is next placed on its side to cool, each bundle is then taken to a cutter, who places it in a kind of wooden vice, across the middle of which a powerful knife is made to descend, and cuts the bundle into two equal halves, thus the five hundred double matches are now made into a thousand single ones. For the next process, it is necessary that the matches be kept asunder; they are laid in parallel grooves made

on long strips of wood, an inch and a quarter across, each holding a hundred matches. This task was formerly done by children, but is now far more rapidly and cheaply effected by an ingenious machine. At the top of it is a long hopper, into which the matches are poured, they fall on to a grating of parallel wires, a slight lateral shake of which allows a sufficient number of matches to pass through to fill one of the wooden strips, this strip is then transferred to a frame, and an empty one substituted. The frame is in time filled with rows of matches, all arranged parallel, their sulphured ends projecting. Each frame-full is placed face downwards on a shelf, in a sort of scaffold or stage, which when full is wheeled into the dipping-room. There they receive the final coating of the phosphorus mixture. It is kept fluid in an iron trough by means of steam. A man, stationed before it, takes a frame-full of matches, and just dips their sulphured ends slightly into the composition. A very slight application is enough. The matches are then put aside to dry. When set, they are conveyed to the packing-rooms. A frame-full is placed before one of the girls. She takes one of the wooden laths, and dexterously sweeps off the one hundred matches ranged upon it into a box, pushing on the cover. To fill the smaller boxes, she sweeps off fifty only. Thus filled, they are taken away to be labelled and packed in dozens and grosses. The manufacture of the boxes is quite as interesting a process to watch as that of the matches. The planks are shaved into long veneers about  $\frac{1}{8}$  inch thick, from which the boxes, and slip-on cases, or lids, are stamped out, to be afterwards put together with the help of an outer paper wrapping and finger paste. At this manufactory, which is not by any means one of the largest, about half a million boxes of matches are made weekly. In the winter they are kept busy supplying the home trade; in the warmer months, the foreign and export trade, which is some-

thing enormous, and increasing rapidly. Mr. Martindale employs about two hundred and fifty persons, of whom one hundred are girls. The latter are engaged in filling the frames, packing and boxing. I was much pleased with the generally healthy and comfortable appearance of the work-people. The rooms were well ventilated, and I was glad to hear that not a single case of the terrible disease, once so prevalent, had occurred amongst them for years. The kind of lucifer match of which I have described the manufacture, is the commonest and cheapest of any. It readily inflames by friction upon any rough surface, but for that very reason is the most dangerous. Some of the French matches have the sulphur coating external to the phosphorus one; these require strong friction to produce a flame, but for that very reason have never been popular in this country. Messrs. Bryant & May have divided the composition between the match and the friction paper, such matches will not inflame by ordinary friction. They use the amorphous phosphorus, first prepared by Schrötter of Vienna. In this state it is a red powder, not readily inflammable. This, diffused through a quantity of glue, with some powdered glass and colouring matter, forms the composition which is spread outside the safety match box. The Messrs. Letchford use no sulphur, but instead soak the end of each match in paraffine. These are not injured by damp, and burn almost without smell. Many of the German and Swiss matches are made without phosphorus, some being dipped in a mixture containing chlorate of potash and hyposulphite of lead; but they are not so pleasant in use as the others.

Enormous quantities of lucifer matches are now exported wherever English enterprise has reached. The very desert around the pyramids of Egypt is strewn with lucifers and bitter beer bottles. The new fire-maker is extinguishing all the old ones. An English manufactory, that of the Messrs.

Dixon, at Manchester, is said to turn out six to nine millions of matches daily. And it is estimated that the total quantity made is at least 300,000,000,000 of matches in a year! We live not only in the age of Iron, but of Flame. We travel on iron roads, and cross the seas in iron vessels, both propelled by fire. The days of wood and stone are giving place to those of metal and glass, both products of fire. A friend informs me that, so late as the year 1810, the principal water mains in Liverpool were wooden pipes, formed by hollowing out tall straight trees.

Let us recapitulate. We have seen reason to believe that in some far-off time men existed who were utterly ignorant of fire and of its uses, though they have left no trace behind in the region of antiquities. What could they leave? That men at length discovered a rude and painful method of fire making, by the rubbing together of dry wood; a method so universally diffused and long practised that it exists still in almost every region of the earth, among rude, half-civilised races, and has come down to us with the traces of ancient and forgotten faiths. At this point, men were content to rest, for probably tens of thousands of years, which have left to us innumerable relics of their work in stone and bone and wood. At length mankind became acquainted with the ores of the more obvious metals, which were first used in the cold state, unmodified by fire. Next the more fusible were wrought; and when this was extended to the difficultly fusible ores of iron, they obtained the flint and steel, the use of which, as the most improved fire-maker, extended through more than two thousand years, down even to our own time. That within the last fifty years new methods of fire-making have been discovered, so easy, cheap and portable, that they are driving out all the old forms, and seem to leave

nothing further to be desired. Du Chaillu tells us that, some three years ago, he met in his journeyings with a tribe of Africans who had never seen a white man. He asked to see how they made fire. One of them accordingly squatted down, and worked away at the fire-sticks until the perspiration dropped from him. Then another came to his aid, and at length a little smouldering spark was obtained. Du Chaillu took out his tiny box of Vesuvians, and in a moment produced a cascade of flame! The astonishment of the poor Ashangos was beyond measure. They trembled all over, and became speechless. They would have fallen down and worshipped him, as a god of fire! What unnumbered ages of social progress did that lucifer match symbolise! And how much of that progress has been achieved in our time, and even in our own land!



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Journal of the Chemical Society, June, August, September, 1867		<i>The Society.</i>
Air-breathers of the Coal Period	}	<i>Dr. Dawson, Montreal.</i>
Conditions of the Depositions of Coal, &c.		
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